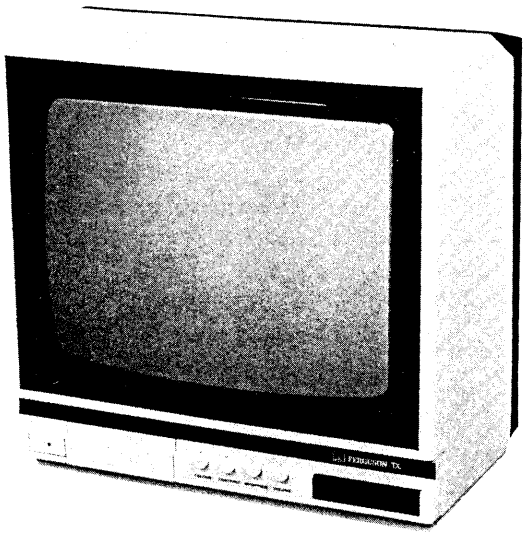
SECTION G

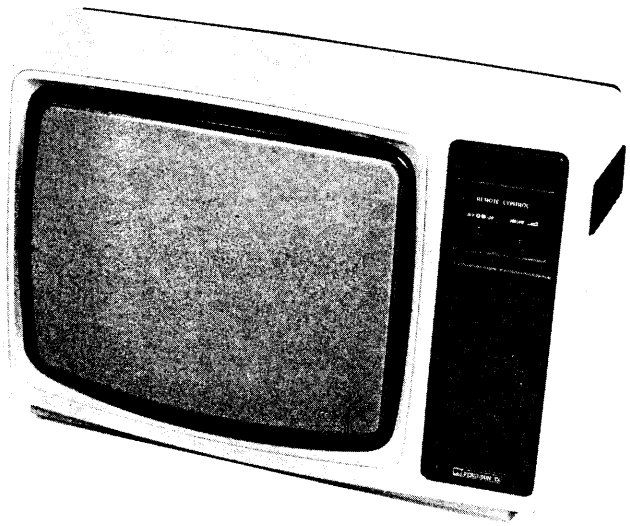
Portable Colour Television

MODELS 14C1, 14C2, 16A1 and 16A2 + 16A3

14C1



Model 14C2
14" (V34cm) Remote Control TV



Model 16A2
16" (V38cm) Remote Control TV

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INTRODUCTION

Model 14C1 is the basic 14-inch non-remote Model (successor to Model 37140) and uses the same main PCB (PC1130).

PC1130 information is covered in Section A of the Service Manual and Circuit Diagram Sheet Issue One.

Modifications introduced since publication of Section A are covered in this supplement.

Model 14C2 is the 14-inch remote control version (successor to Model 37141) using the PC1140 main PCB (see notes on page B8 of Section B).

The remote control circuits (U740 System) are basically similar to the U735 System, covered in Section B, but modified for 16-channel operation (U735 is 8-channel).

Circuit diagrams, PCB layouts and components lists for the remote control boards are included in Section E pages E12-E16 with further notes on page E2.

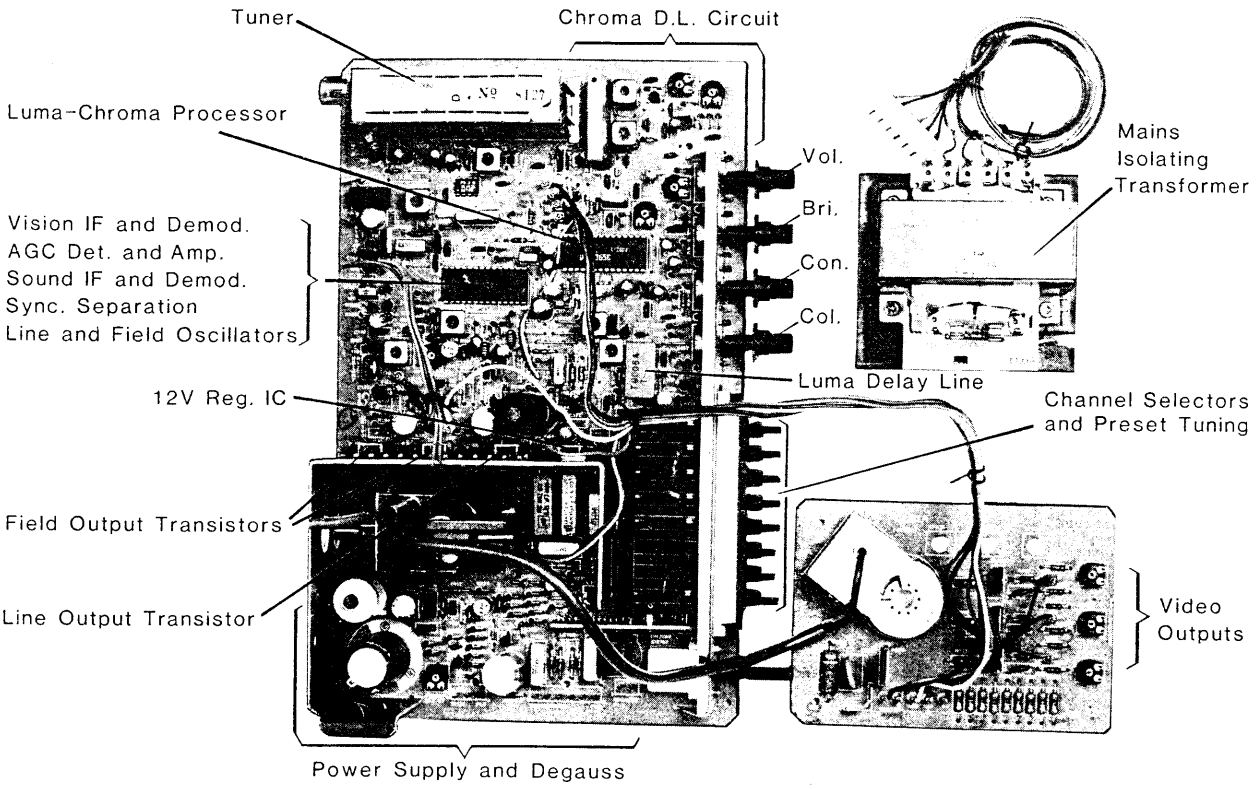
Models 16A1 and 16A2 are the 16-inch Models using the PC1140 in its non-remote and remote versions respectively with detail component differences to cater for higher beam current. Circuits, layouts and component lists are included in this supplement. The 95V HT rail is increased to 97·5V and the 150V rail goes up to 160V approximately.

Model 16A2 uses the same remote control circuits as Model 14C2.

SECTION A

Main Panel PC1130

Also including CRT Panel PC1131 and Battery Converter TA127A



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Main Receiver Circuit Diagram (PC1130, PC1131)
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Component Layouts (PC1130, PC1131)
Interconnections Wiring Diagram

Specification

Power Supplies

Fully isolated chassis. 240V or 220V a.c., 50Hz (Alternative tap on mains transformer for 220V operation)

Fuses

2 × 20mm cartridge type, mounted on mains transformer, each rated at T1A, wired in primary and secondary of transformer.
The 12V regulator IC is self-protecting against overload and an overvoltage trip circuit, with automatic reset, is wired in the 150V d.c. rail.

Power Consumption

Typically 46.5W with normal picture, 50W maximum and 38.5W at zero beam.
Battery operation (with TA127A Converter) 4.5A maximum at 12V.

Frequency Coverage

Channels 21-68 471.25MHz - 847.25MHz (Vision carriers).

Tuner

Electronic varicap with voltage stabilization and AFC.

Sensitivity

Better than 50μV for a fully contrasted picture with sound and locked colour.

Vision IF

Adjacent channel (vision) 31.5MHz. Sound carrier 33.5MHz. Chroma subcarrier 35.07MHz. Vision carrier 39.5MHz. Adjacent channel sound 41.5MHz.

Audio Output

Approximately 700mW r.m.s. at 5% THD.

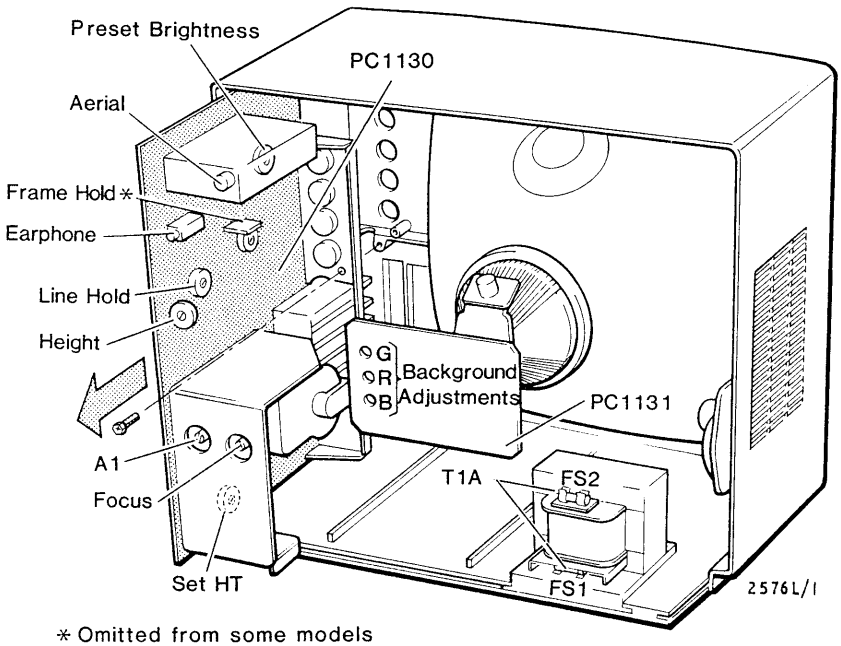
EHT

Approximately 18.7kV at zero beam current.

Picture Tube

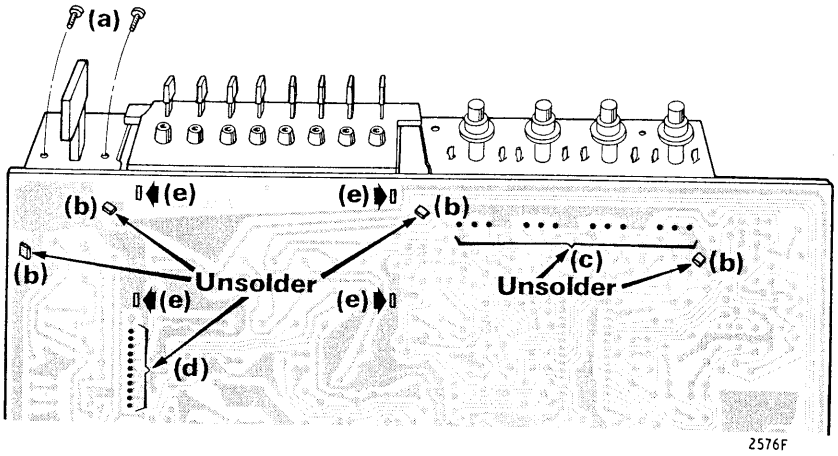
'Mini-neck' type. 90° In Line with integral saddle toroidal self-convergence deflection yoke. 6.3V heaters (measured with thermocouple).

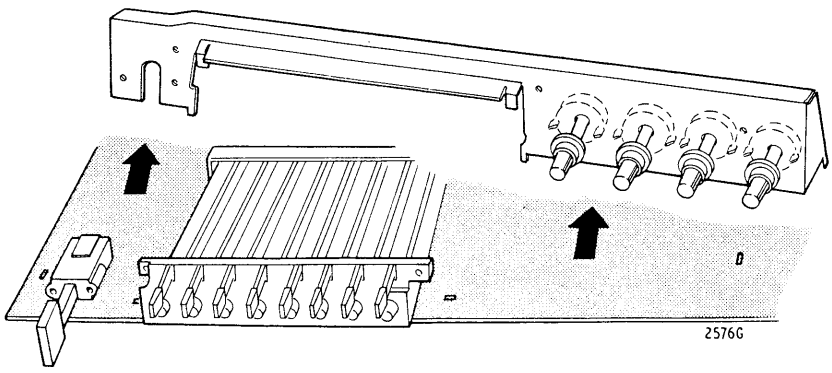
ACCESS FOR SERVICE



* Omitted from some models

Main PCB slides out after removing one screw.
Preset adjustments are described in the main Circuit Diagram Sheet (folded insert).





WARNING

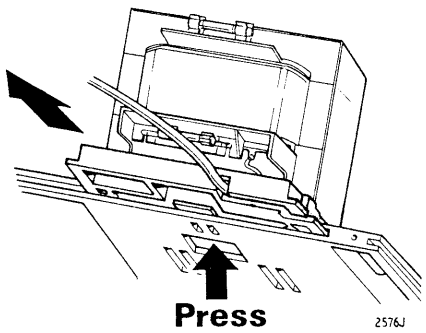
EHT Shock Hazard

The EHT must be safely discharged before disconnecting the lead from the tube anode cap.

Using a convenient lead such as a meter lead, clip one end to the aquadag braid, fold back the suction cap and discharge the EHT with the lead.

Press in one side of the spring clip which projects into the tube cavity to ease removal of the connector.

IMPORTANT: Do not disturb the tube neck adjustments. These have been set for optimum performance during tube manufacture.



Releasing mains transformer assembly from cabinet.

Detaching Channel Selector Moulding

With reference to the accompanying illustrations:

1. Remove two screws securing the On/Off switch (**a**).

2. Unsolder and straighten the four* lugs on the metal bracket, projecting into the PCB (**b**).

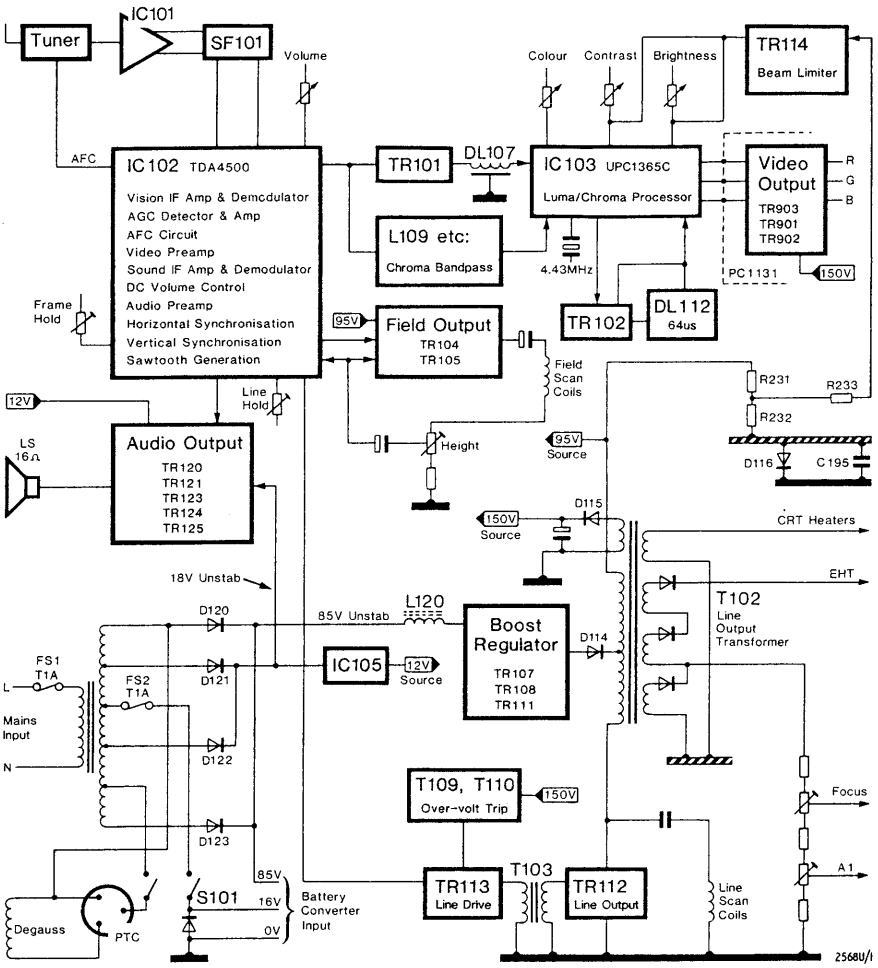
3. Unsolder the potentiometer tags (**c**); The bracket then comes away with the potentiometer attached, as shown.

4. To release the selector moulding, unsolder the eleven tags (**d**) holding the small vertical PCB and release the four barbed locating lugs (**e**).

**Two lugs in some PCB's*

TX90 CIRCUIT DESCRIPTION

Refer to Circuit Diagram Sheet (Folded Insert)



Introduction

TX90 is a new chassis designed to drive a small screen CRT of the 'mini-neck' type. Provision is made for mains or battery operation (an add-on converter is required for battery operation). A personal earphone socket is also provided. The chassis is fully isolated by the use of a cabinet mounted mains transformer and operates from a.c. mains supplies nominally 240V or 220V (The mains lead neutral is soldered to the alternative tag for 220V operation.)

The mains On/Off switch is wired in the secondary of the transformer with two 1 amp anti-surge type fuses, one in the primary and one in the secondary windings. The fuses are mounted on the mains transformer for easy access.

The majority of the components including the tuner, channel selector and front controls are carried on a vertically mounted main panel (PC1130) whilst the video output stages are mounted on the CRT base panel (PC1131).

Power Supplies

The secondary windings on the mains transformer provide (via full-wave rectifiers) two unregulated d.c. supplies:

1. 85V nominal from D120 and D123 which is boosted to **95V** via a winding on the line output transformer in conjunction with a special regulating circuit. This is the main HT line.

2. 18V nominal from D121-D122 which drives the sound output transistors directly and also drives the **12V** regulator, IC105, which in turn supplies all the small signal circuits.

A 120V tap on the mains transformer secondary feeds the low voltage degauss circuit via one pole of the On/Off switch.

The diode-split type line output stage provides the following auxiliary supplies:

1. CRT heater potential (winding 1, 2).

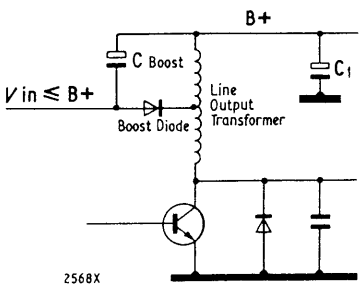
2. **150V** regulated via D115 for the video output transistors. This rail is monitored by an overvoltage trip which shuts down the line output stage and hence the 95V regulator in the event of an over-voltage condition.

3. Focus and A1 which are tapped from the EHT overwind - tripler circuit.

95V Regulated Supply - Sliding Tap

Regulation of this rail ensures the maintenance of constant width and EHT.

The 85V unregulated supply from the mains transformer and rectifier feeds the self regulating line output stage via L120, TR107 and boost diode D114 yielding 95V (B +) across C191.



Regulation is achieved by 'sliding' the tap position of the boost rectifier (D114) in accordance with variations in the load on the line output stage and the supply voltage (V_{in}). As V_{in} decreases, the tap is moved down the primary towards the line output transistor to increase the boost ratio and maintain B + constant at 95V.

In practise it is necessary to provide only a fixed tap at the lowest position on the line output transformer primary. Any intermediate position can be simulated electronically.

D109, TR107 form a switch which can connect V_{in} to either the boost tap or directly to the B + (95V line). The boost tap is positioned such that V_{in} of 70V will produce a 25V boost, i.e., 95V B + rail.

The normal limits encountered of V_{in} are 70V and 95V.

When V_{in} = 95V, TR107 will be cut off and V_{in} feeds direct to the B + rail, via L120 and D109. 95V represents the upper limit of the regulated range.

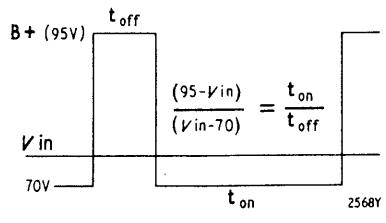
When V_{in} = 70V, TR107 is on and V_{in} feeds the boost tap which in turn generates a B + line of 95V. 70V represents the lower limit of the regulation range.

Any intermediate value of V_{in}, e.g., 80V will cause the 'switch' to operate rapidly (line rate) connecting V_{in} as follows:

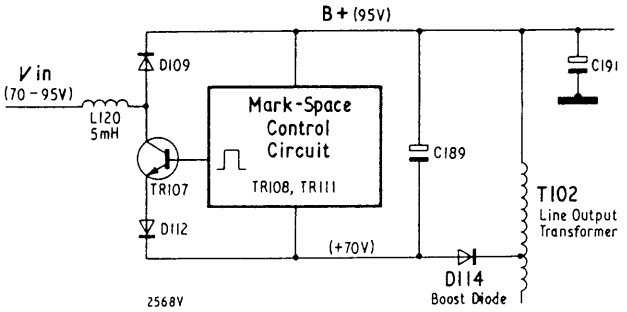
1. First to the '70V line' via L120, TR107 etc.
In this condition, energy is supplied to the line output transformer via the boost tap, the excess voltage (V_{in} - 70V) appearing across L120. The energy stored in L120 is proportional to the excess voltage and the conduction time of TR107.

2. The 'switch' then changes state and the stored energy within L120 produces an e.m.f. which when added to V_{in} causes D109 to conduct, supplying energy direct to the B + line.

TR107 Collector Voltage Waveform



In the equation above, which shows the relationship between V_{in} and the mark-space ratio, t_{on} denotes the conduction of time of TR107. Therefore, by controlling the mark-space ratio of the line frequency 'switch', the relationship between V_{in} and B + can be continuously adjusted for values of V_{in} between the operating limits of 70V and 95V, thus providing the electronic equivalent of a sliding tap on the boost winding.



Control Circuit

The control circuit comprises the driver transistor TR108, the error amplifier, TR111, and associated components.

The error amplifier, TR111, compares a fraction of the 95V rail, obtained from the potential divider chain which includes the set HT preset RV224, with the reference voltage from zener D111 on the emitter and produces an error current proportional to the difference. This current is summed at the base of TR108, with a sawtooth current provided by R220 (from integrated line pulses across C186) and with a fixed negative-going current flowing in R210 and parallel resistors.

Under normal operating conditions the voltage at the junction of D112/D114 is held at approximately 67V. It follows that if the voltage at D110 cathode/TR108 base rises or falls (from 67V) by about 0.6V, either TR108 or D110 will start to conduct. When D110 is ON the voltage across R210 (and parallel resistors) is held at 67V −0.6V and the total current through R210 (and parallel resistors) is about 5.5mA (67V/12kΩ).

In order to turn-on TR108 the voltage at its base must rise by about 1.2V (turning-off D110 and turning-on TR108). This is achieved by increasing the value of the instantaneous current to this point; this current is the combination of the sawtooth current through R220 and the error current through R219. TR108 is turned-on during the rising edge of the sawtooth waveform and is turned-off at a point on the trailing edge. The precise point is determined by the amount of error current flowing. The greater the error current (e.g. due to 95V rail tending to rise) the longer TR108 is on and the less time that TR107 is on—hence reducing the 95V rail back down to 95V. Thus the error current determines the mark/space ratio of the switching signal to TR107. RV224 (Set HT) is adjusted, at black level, so that B + is 95V.

Protection Circuits

The line derived 150V rail is monitored by an overvoltage trip formed by TR109 and TR110 which are coupled as a regenerative switch.

Under normal operating conditions base bias for the line driver (TR113) is obtained from the regulated 12V line via R217 and R215. At this time TR110 will be off.

If the 150V rail should increase to approximately 165V then the emitter of TR109 rises, switching on TR109 which in turn switches on TR110, thus pulling down the bias voltage of the line driver, TR113. Consequently TR113 will be held on hard, thus shutting down the line output stage. Since the boost regulator is in series with the line output stage it also will automatically shut down. The trip circuit automatically resets when the overvoltage condition has cleared (150V line falls below approximately 155V).

The 12V regulator IC105 is provided with internal overload protection.

Timebases

The multifunction processor IC (IC102) includes the sync separator, line and field oscillators and the field preamp.

Sync Separator

The Sync Separator operates in conjunction with a noise pulse inversion circuit (contained within IC102) to prevent noise from falsely triggering the oscillator circuits.

The sync slicing level is determined by R139, R130 and C129 connected to pin 26 of IC102.

Output sync signals are fed to a gating circuit in IC102, where the line pulses are gated during the field sync period to preserve optimum vertical straightness.

The complete field integrated circuit is contained within IC102.

Line Phase Detector and Oscillator

The internal line phase detector (flywheel) of IC102 produces a voltage on pin 25 which is dependent upon the relationship between the internally supplied line sync and the comparison ramp (derived by integrating the line flyback by R106, C110) supplied to pin 5 of IC102.

The external loop filter components C125, R131 and C130 are connected to pin 25 (IC102).

VCR compatability and fast lock-up are achieved whilst retaining the weak signal performance of a slow loop by employing a switched dual-gain phase detector. (Switching is automatically performed when the appropriate programme button is selected.)

The line oscillator is internal (within IC102) and the free running frequency is determined by C124, R128 and RV129 (Line Hold) connected to pin 23.

The output at pin 27 feeds the line driver TR113.

Line Driver TR113

This stage operates from the 12V line and receives direct drive from pin 27 of IC102, as previously mentioned. The drive can be over-ridden by the trip circuit—in the tripped condition TR113 is held in conduction. Transformer coupling is employed between the driver, TR113 and the line output transistor, TR112.

Line Output Stage, TR112, T102

Apart from the boost tap connection to the line output transformer this stage is of orthodox design providing the following:

1. Line scan waveform.
2. A1, Focus and EHT d.c. potentials.
3. CRT heater potentials.
4. 150V d.c. rail.
5. The boost proportion of the 95V rail.

Line pulses appearing at the boost tap are utilized in the generation of blanking and burst gating pulses, also in their integrated form as reference ramps for the line oscillator phase/frequency control loop and the B + (95V) regulator circuit.

C194 is the line tuning capacitor and C193 provides 'S' correction and d.c. blocking.

The A1, Focus and EHT potentials are obtained from the overwind which has a diode split configuration.

Field Oscillator

The sync signal is also fed to a field sync separator within IC102 and the output from this stage is fed internally to the field oscillator.

The field oscillator free running frequency (approximately 40 Hz) is determined by RV174, R116 and C112, coupled to pin 1 of IC102. The output from the field oscillator is fed to the internal field preamplifier of IC102.

Waveform shaping of the field drive waveform is applied internally within IC102, thus no external linearity network is necessary.

A suitable output is available at pin 2 to drive the 'Darlington' field output device. Feedback (a.c. and d.c.) is applied from the field output stage to pin 3 of IC102.

Field Output

TR104 and Darlington pair TR105 are connected in a high voltage 'totem' configuration supplied from the 95V line.

R203 and R200 serve to regulate the quiescent current. Base bias for TR104 is derived from the 150V rail via R199 etc., precluding the use of 'bootstrap' components.

R194 and R192 form a potential divider which determines the level of d.c. feedback to set the output stage mid voltage at 40V. The a.c. feedback is applied via C172 from the field current sampling resistor R190 and Height control RV202.

Operation. The constant current source field output at pin 2 of IC202 gives a sawtooth current which drives Darlington pair TR105. In turn TR105 drives another amplifier, TR104. The first half of scan and the second part of the flyback are provided by TR104. TR105 provides the second half of scan and D106 provides the first part of flyback.

Let us consider that TR105 has just been switched on from pin 2 of IC102. TR104 is biased hard on by the feed from the 150V line via R186 etc. and passes maximum current into the scan coils via C171 (maximum deflection). D107 is reverse biased at this time.

As TR105 is turned on harder by its sawtooth input TR104 base voltage decreases in a sawtooth manner reducing the sawtooth current through TR104 and the scan coils until the scan current reaches zero.

There is now no further voltage change at TR104 emitter and this is sensed at junction R194/R192 and conveyed to pin 3 of IC102. IC102 immediately increases the sawtooth drive to TR105, allowing current in the scan coils to build up in the opposite direction via C171, D107 and TR105. At flyback TR105 is suddenly cut off by the sharp pulse at the base—TR104 base goes high. A large positive voltage is produced across the scan coils which, via C171 takes TR104 emitter high, still keeping TR104 off. Due to the high positive flyback voltage D106 conducts and reduces the scan current to zero by dumping it into the 95V rail. As the positive flyback voltage reduces, TR104 emitter drops, bringing TR104 back into conduction for the next scan cycle. The value chosen for R200 and R203 determine the quiescent current.

Sound Circuits

IC102 contains all the sound channel circuits with the exception of the output amplifier.

The limiting amplifier input (pin 15) obtains the intercarrier sound signal via the ceramic filter FL1 from the video output on pin 16. The amplifier intercarrier signal is applied to the quadrature demodulator stage within IC102. C113, L104 etc., form the tank circuit which is connected to pin 13 via d.c. blocking capacitor C114.

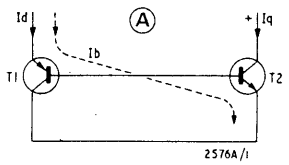
The detected audio is then fed via an attenuator stage with the signal level being set by the d.c. Volume control on pin 11.

The voltage at pin 11 is also affected internally by the sync coincidence detector providing an automatic mute facility during channel change and/or during interstation tuning.

An output of up to 240mV r.m.s. maximum is fed out at pin 12 to drive the discrete sound output stage.

The sound output stage employs a novel circuit configuration which removes crossover distortion and regulates the quiescent current, enabling the output transistors, TR123 and TR125, to operate without heatsinks.

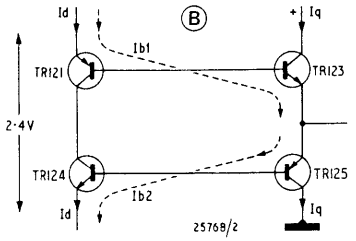
TR120 provides the voltage gain of the amplifier which is set at × 12 by the feedback resistor R184 in conjunction with the input circuit impedance comprising R182 and R181. (R182 and C166 provide de-emphasis.) A reference d.c. current is supplied from the 95V rail via R183 and together with feedback resistor R184 sets the output stage mid position at a nominal level of 5.5V.



Quiescent Condition. Considering the Diagram **A**, which represents the 'top half' of the output stage:

If current I_d is injected into the emitter of T1 both *b-e* junctions will forward bias and current I_b will flow in *both* bases. The level of I_b will be just sufficient to maintain I_d in T1, if the current gains of the transistors are equal. I_q flowing in T2 (due to I_b) will equal I_d.

The output stage consists of a complementary pair of these networks, connected in series to maintain the quiescent current.

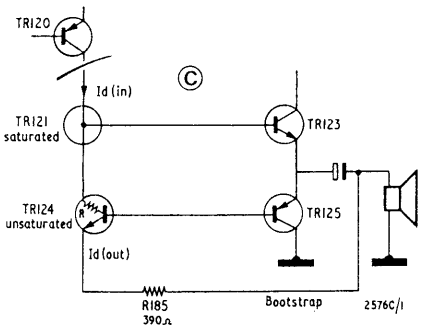


It should be clear from Diagram **B** that the voltage available for TR121 and TR124 to *share* is fixed at four V_{be} drops (2.4V). Transistors operated with low collector-emitter voltage exhibit voltage dependent current gain, the gain falling to unity as saturation is entered. This characteristic is utilised by TR121 and TR124 to automatically equalise the gains of the upper (TR121 and TR123) and lower (TR124 and TR125) networks.

If the gain of the upper network is initially greater than that of the lower network, TR121 will receive a smaller share of the 2.4V than TR124, consequently the gain of TR121 will fall and that of TR124 will increase until equilibrium of upper and lower network gain is reached.

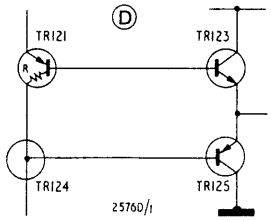
The *Vce's* of TR121 and TR124 are indeterminate as a function of the individual gains of all 4 transistors. The sum of the *Vce's* is 2.4V.

Dynamic Operation. It must be appreciated that the bootstrapping effect of R185 keeps Id (out) substantially constant over an output cycle.



The collector current of driver transistor TR120 increases during the positive half-cycle, supplying the extra base current required by TR123 to drive the loudspeaker. However, this increased base current also flows in TR121 and is much larger than that required by TR121 to sustain Id (out). TR121 being overdriven enters saturation and TR124 acquires almost all of the 2.4V. TR121, being saturated, is omitted from **C**. Since TR124, however, is far from saturation (*Vce* = 2.4V) its output resistance is very high (R in Diagram **C**) therefore none of the *increase* in Id (in) can be passed by it. All of the *increase* in Id (in) is used as base current by TR123.

The converse of this is true during negative half-cycles and is illustrated by Diagram **D**.



Tuner and IF

Since the chassis is fully isolated, an aerial isolation unit is not required, allowing the tuner to be fitted with an integral aerial socket.

Tuning voltage is provided by a combined channel selector/tuning potentiometer assembly fitted directly to the PCB.

The tuning potentiometers are supplied with the regulated 32V which is derived from the 95V rail via resistor bank R204 etc. in conjunction with regulator D119.

The tuning assembly incorporates switch contacts for AFC defeat, operated by the tuning key being released in its storage compartment, i.e. when the tuning door is opened. Automatic switching is activated on programme 8 for VCR compatibility.

The IF output from the tuner is fed via the preselection and matching network formed by L103, C104, C105 and C106 to the preamplifier and SAWF driver IC101. An AGC feed to the tuner is provided from pin 7 of IC101.

IF response shaping is carried out by SF101 which is balanced driven and loaded. The output is fed to pins 8 and 9 of the multi-purpose IC (IC102) which forms the differential input of the IF amplifier. Decoupling of the internal IF amplifier is achieved by C121 connected to pin 18.

Line gated AGC is derived and applied within IC102, its response time being controlled by an external time constant, R140 and C127 connected to pin 24.

In the absence of synchronized gating pulses, i.e. during channel change etc., the internal overload protection circuit controls the AGC. Output from the IF amplifier within IC102 is fed internally to a synchronous demodulator.

The tank circuit (L105, L115, C122, C149) is connected to pins 20 and 21 and tuned to the vision carrier frequency.

An internal 'take-off' across pins 20 and 21 feeds a 90° R-C phase shift network which then feeds the AFC detector. This arrangement precludes the use of a separate AFC detector tuned circuit. The AFC output is available on pin 17 and has a swing value of approximately 9V.

Output from the synchronous demodulator is fed within IC102 to a video amplifier and the video output (approximately 3Vp-p with negative-going sync) appears on pin 16. The sound intercarrier is selected by FL1 etc. and fed back into IC102 pin 15 as described under 'Sound Circuits'.

Luma - Chroma Processing

The luminance, chrominance and video processing is all carried out within IC103 (similar circuit to that used in TX9 PC1001 version).

The positive-going video signal from pin 16 of IC102 is taken via L114, and the 6MHz rejector L106, C118 etc., to the inverting amplifier TR101. The chroma signal is taken off via the subcarrier acceptor circuit formed by L109 and associated components to pin 11 of IC103. L108 and C123, in the emitter of TR101, form a subcarrier rejector and the luma signal, obtained at the collector, is fed via the luma delay line, DL107 to pin 5 of IC103. From pin 5 the luma signal is applied to the video amplifier within IC103. C137 on pin 6 provides frequency compensation. Black level clamping is applied internally by the pedestal clamp, which is gated through pin 19 by a suitable pulse derived from the line flyback via the lag/lead network formed by R168, R167, C163, C162, R171 and clipper diode D103. The pulse is also used for burst gating and is linked to pin 23 for PAL switching.

The pedestal clamp voltage is decoupled by C135 on pin 3. Adjustment of the voltage level is provided on pin 4 by inputs from the Preset Brightness, Brightness control and the beam limiter circuit.

The d.c. clamped luma is then fed to a contrast control circuit within IC103, which depends on the d.c. applied to pin 7 by the Contrast control—also applied to pin 7 is a feed from the beam limiter circuit.

Output from the internal contrast controlled circuit is fed to the RGB matrix and also as input signal to the pedestal clamp circuit.

The R, G and B signals on pins 26, 28 and 27 are passed to the video output stages. Mixed blanking is applied to pin 2 of the IC.

Chroma Circuit

The chroma signal taken from L109 etc. in the emitter of TR101 is applied via pin 11 of IC103 to the ACC amplifier within the IC. Bias for the ACC amplifier is obtained from the ACC detector which is fed with gated burst. C142 and R153, on pin 12, form the ACC detector time constant.

The ACC amplifier is followed by an internal chroma amplifier which feeds the colour saturation control circuit and the burst amplifier. The d.c. bias from the Colour control is applied to pin 8.

The level controlled chroma is then fed to the contrast control circuit where further adjustment is applied. (The Contrast control is applied to both luma and chroma signals to ensure that the two track together.) After passing through the internal chroma output circuit the composite chroma leaves the IC on pin 9 and is applied to the delay line circuit TR102, DL112 etc. which yields the 'U' and 'V' components for reinsertion into the IC on pins 25 and 24 (B-Y and R-Y detector inputs). After detection and matrixing to obtain the G-Y component the chroma signals are internally matrixed with the luma to give the RGB outputs on pins 26, 28 and 27. Line and field blanking pulses are applied to pin 2 of the IC.

The burst signal appearing on pin 15 contains both burst and chroma, the level of chroma being dependent on the setting of the Colour control, i.e. the more saturated the picture the less chroma will appear on pin 15, but the burst amplitude will remain constant.

From pin 15 the burst is passed through an adjustable phase control circuit L110, RV180 C160, and thence via pin 16 to the ident killer circuit and the APC detector within the IC.

A reference 4.43MHz carrier is generated by the voltage controlled oscillator within IC103 with frequency control determined by external components on pins 20, 21 and 22.

The reference oscillator has internal feeds to the APC detector, the B-Y detector and to the PAL switch (and hence R-Y detector).

The reference phase is correctly maintained by comparing it with the burst within the APC detector. An external bias is fed differentially via pins 17 and 18 into the APC detector allowing the free running phase of the voltage controlled oscillator to be adjusted by means of RV179.

Burst is fed from pin 16 internally to the ident killer circuit which detects the swinging phase of the burst, and hence 7.8kHz ident signal is fed to the PAL switch circuit.

A bias which is dependent on the ident is fed to the chroma output circuit and to the bistable. This feed is decoupled on pin 13 by C143 and the potential is dependent on the resistor network R154, R155 and R156. The potential on pin 13 is the 'killer bias' and if reduced will kill the chroma on pin 9. The killer onset point is determined by the value of R156.

The delayed line gating pulses fed in on pin 23 go to the bistable and produce a 7.8kHz signal—when this is in phase with the ident signal (derived from the swinging burst) then the chroma output will be enabled.

Beam Current Limiter

The beam limiter controls the maximum power dissipation of the receiver and protects the tube from developing purity errors associated with mask distortion due to overheating.

A facsimile of the video waveform will be present on the EHT voltage and a waveform similar to this is therefore developed across a load from the beam current. The load comprises R231, R232 connected between the 95V rail and the CRT earth return. D116 is a d.c. restorer. The voltage developed at the junction of R231/R232 is applied via R233 to the beam limiting transistor TR114 which is connected to the contrast and brightness control networks. As the beam current increases, the voltage at the anode of D116 goes in the negative direction. By potential divider action, the base potential of TR114 will also go in the negative direction, turning on TR114 and pulling down pins 4 and 7 of IC103, thus reducing the brightness and contrast level of the signal fed to the video output stages.

The value of R231 is chosen to achieve the required maximum beam current and the decay time of the limiter is extended by C196 to prevent shading over the field.

Avoiding Damage to ICs from Static Voltages

All ICs are vulnerable to static damage unless properly mounted in printed circuit boards or in approved packing.

They must be handled with care and must not be loosened, removed from, or inserted into a 'live' circuit.

Always touch an earthed object before handling any IC or PCB, and use an earthed soldering iron.

Replacement ICs are supplied packed in conductive materials, which may be manufactured from special plastics. Keep ICs in transit packing until used and when returning suspect devices under guarantee, always protect them in the original packing.

Do not use non-conductive plastics such as polystyrene, even for temporary storage of integrated circuits.

COMPONENT DETAILS

When ordering replacements, quote model number, component reference description, part number and printed board number.

⚠ Denotes safety components—see note on Circuit Diagram sheet.

Each description and part number is followed by the component function.

Main Panel, PC1130

PCB Assembly, 01V6-130-001

RESISTORS

R101 47kΩ 5% 0·25W, R5470-GF02-09RG
Tuning voltage feed
R102 2·7MΩ 5% 0·25W, R7270-GF02-09RG
AFC feed resistor
R106 27Ω 5% 0·25W, R2270-GF02-01RG
Line flyback integration, with C110 etc
R107 1kΩ 5% 0·25W, R4100-GF02-09RG
AGC feed to tuner from IC101
R108 1kΩ 5% 0·25W, R4100-GF02-09RG
RF AGC potential divider, with R109
R109 3·3kΩ 5% 0·25W, R4330-GF02-09RG
See R108
R110 390Ω 5% 0·25W, R3390-GF02-09RG
Impedance matching, SF101 output, with C111
R111 4·7Ω 5% 0·25W, R1470-GF02-01RG
12V rail decoupling and feed, with C133, to IC103
R112 3·3kΩ 5% 0·25W, R4330-GF02-09RG
L104 damping resistor
R114 10kΩ 5% 0·25W, R5100-GF02-09RG
Volume control parallel resistor
R115 47kΩ 5% 0·25W, R5470-GF02-09RG
Tuner takeover load, IC102 pin 4
R116 590kΩ 1% 0·25W (metal film), R6590-BM02-08RG
Field osc. time constant, with C112 (IC102 pin 1)
R119* 1kΩ 5% 0·25W, R4100-GF02-09RG
AFC defeat switch reference pot. divider, with R120
R120 1kΩ 5% 0·25W, R4100-GF02-09RG
See R119
R121 470Ω 5% 0·25W, R3470-GF02-09RG
6MHz filter FL1 output impedance matching
R122† 470Ω 5% 0·25W, R3470-GF02-09RG
Input impedance matching, for FL1
R123 6·2kΩ 5% 0·25W, R4620-GF02-09RG
Part 6 MHz rejector, with L106, C118 and C119
R124 100kΩ 5% 0·25W, R6100-GF02-09RG
AFC reference voltage divider, with R125
R125 100kΩ 5% 0·25W, R6100-GF02-09RG
See R124
R126 3·3kΩ 5% 0·25W, R4330-GF02-09RG
TR101 base bias
R127 680Ω 5% 0·25W, R3680-GF02-09RG
TR101 collector load
R128 28kΩ 1% 0·25W, R5280-BM02-PH27
Line osc. external time constant with RV129 and C124
R130 820Ω 5% 0·25W, R3820-GF02-09RG
Sync separator clipper time constant, with C129 and R139
R131 2·7kΩ 5% 0·25W, R4270-GF02-09RG
Part line osc. external loop filter, with C125 and C130
R132 120kΩ 5% 0·25W, R6120-GF02-09RG
Coincidence detector time constant with C131 IC102 pin 28
R134 68kΩ 5% 0·25W, R5680-GF02-09RG
Brightness control feed to Preset Brightness circuit and IC103 pin 4
R135 2·2kΩ 5% 0·25W, R4220-GF02-09RG
Luma delay line terminating resistor
R136 1·5kΩ 5% 0·25W, R4150-GF02-09RG
Luma delay line feed resistor
R137 1kΩ 5% 0·25W, R4100-GF02-01RG
TR101 emitter resistor
R138 180kΩ 5% 0·25W, R6180-GF02-01RG
AV coincidence detector time constant with R132 and C131, IC102 pin 28
R139 680kΩ 5% 0·25W, R6680-GF02-09RG
See R130
R140 470kΩ 5% 0·25W, R6470-GF02-09RG
AGC gating time constant, with C127
R142 5·6kΩ 5% 0·25W, R4560-GF02-09RG
Part of brightness control network
R143 2·7kΩ 5% 0·25W, R4270-GF02-09RG
Part of brightness control network
R144 4·7Ω 5% 0·25W, R1470-GF02-01RG
12V line feed and decoupling, with C117 to IC102
R145 82kΩ 5% 0·25W, R5820-GF02-09RG
Part contrast control network to IC103 pin 7
R146 39kΩ 5% 0·25W, R5390-GF02-09RG
See R145
R148 47kΩ 5% 0·25W, R5470-GF02-09RG
Part colour control network to IC103 pin 8
R149 68kΩ 5% 0·25W, R5680-GF02-01RG
See R148
R151 390Ω 5% 0·25W, R3390-GF02-09RG
Part chroma bandpass network, with R157, L109 and C128
R152 39kΩ 5% 0·25W, R5390-GF02-09RG
Part colour control network to IC103 pin 8
R153 220kΩ 5% 0·25W, R6220-GF02-09RG
ACC time constant, with C142
R154 18kΩ 5% 0·25W, R5180-GF02-09RG
Colour killer threshold pot. divider, with R156
R155 470kΩ 5% 0·25W, R6470-GF02-09RG
Colour killer current source
R156 39kΩ 5% 0·25W, R5390-GF02-09RG
See R154
R157 1·5kΩ 5% 0·25W, R4150-GF02-09RG
Part chroma bandpass network with R151
R159 8·2kΩ 5% 0·25W, R4820-GF02-01RG
Sound mute time constant at switch on, with C165
R161 3·3kΩ 5% 0·25W, R4330-GF02-09RG
Green video output terminating resistor
R162 3·3kΩ 5% 0·25W, R4330-GF02-09RG
Blue video output terminating resistor
R163 3·3kΩ 5% 0·25W, R4330-GF02-09RG
Red video output terminating resistor
R164 150Ω 5% 0·25W, R3150-GF02-09RG
TR102 emitter resistor, with R165
R165 150Ω 5% 0·25W, R3150-GF02-09RG
See R164
R167 22kΩ 5% 0·25W, R5220-GF02-09RG
PAL switch ident gating/pedestal clamp feed, with R168
R168 10kΩ 5% 0·25W, R5100-GF02-09RG
See R167 (two in parallel for safety)
R169 390Ω 5% 0·25W, R3390-GF02-09RG
Chroma delay line impedance matching
R170 2·2kΩ 5% 0·25W, R4220-GF02-09RG
Impedance matching for B-Y and R-Y detectors
R171 270kΩ 5% 0·25W, R6270-GF02-09RG
PAL switch ident gating/pedestal clamp network with C162 and C163
R172 3·9kΩ 5% 0·25W, R4390-GF02-09RG
Field blanking pulse feed, with R191 and D117
R173 1·5kΩ 5% 0·25W, R4150-GF02-09RG
VCO phase shift network, with C154 and C155
R175 27kΩ 5% 0·25W, R5270-GF02-09RG
APC balanced current feed, with R177, C157 and C159
R176 1kΩ 5% 0·25W, R4100-GF02-09RG
4·43 MHz osc. frequency damping
R177 27kΩ 5% 0·25W, R5270-GF02-09RG
See R175
R178 1kΩ 5% 0·25W, R4100-GF02-09RG
4·43 MHz filter, with C158
R181 2·2kΩ 5% 0·25W, R4220-GF02-09RG
TR120 base input impedance matching, and de-emphasis with R182, C166
R182 2·2kΩ 5% 0·25W, R4220-GF02-09RG
See R181
R183 1MΩ 5% 0·25W, R7100-GF02-09RG
95V reference feed to sound output
R184 56kΩ 5% 0·25W, R5560-GF02-09RG
Audio feedback to TR120 base
R185 390Ω 5% 0·25W, R3390-GF02-09RG
TR120 collector load with series active bias transistors TR121 and TR124
R186 6·2kΩ 5% 0·25W, R4620-GF02-09RG
TR104 base bias with safety resistors R187, R198 and R199
R187 6·2kΩ 5% 0·25W, R4620-GF02-09RG
See R186
R188 68Ω 5% 0·5W, R2680-GF05-04RG
Earphone sound level adjustment
R190 4·7Ω 5% 0·25W, R1470-GF02-09RG
Field current sampling resistor
R191 22kΩ 5% 0·25W, R5220-GF02-09RG
See R172
R192 27kΩ 5% 0·25W, R5270-GF02-09RG
Part field output feedback pot. divider, with R194
R193 1kΩ 5% 0·25W, R4100-GF02-09RG
TR105 base feed
R194 270kΩ 5% 0·25W, R6270-GF02-09RG
See R192
R198 6·2kΩ 5% 0·25W, R4620-GF02-09RG
See R186
R199 6·2kΩ 5% 0·25W, R4620-GF02-09RG
See R186
⚠R200 390Ω 5% 0·25W, Fusible, R3390-GXP2-ES47
Quiescent current limiting, field output
R201 82Ω 5% 0·25W, R2820-GF02-09RG
Part height adjustment with RV202
⚠R203 33Ω 5% 0·25W Fusible, R2330-GXP2-ES47
Quiescent current limiting, field output
R204 47kΩ 5% 0·25W, R5470-GF02-09RG
Tuning voltage supply resistor, with R205, R238 and R239
R205 47kΩ 5% 0·25W, R5470-GF02-09RG
See R204
R206 270Ω 5% 0·25W, R3270-GF02-09RG
TR107 base bias, with R207, R211 and R212
R207 270Ω 5% 0·25W, R3270-GF02-09RG
See R206
R208 47kΩ 5% 0·25W, R5470-GF02-09RG
TR108 base bias, with R209, R210 and R221
R209 47kΩ 5% 0·25W, R5470-GF02-09RG
See R208
R210 47kΩ 5% 0·25W, R5470-GF02-09RG
See R208
R211 270Ω 5% 0·25W, R3270-GF02-09RG
See R206
R212 270Ω 5% 0·25W, R3270-GF02-09RG
See R206
R213 51kΩ 5% 0·25W, R5510-GF02-09RG
TR109 emitter potential divider, with R214 and R216
R214 82kΩ 5% 0·25W, R5820-GF02-09RG
See R213
R215 470Ω 5% 0·25W, R3470-GF02-09RG
TR113 base bias feed
R216 10kΩ 5% 0·25W, R5100-GF02-09RG
See R213
R217 390Ω 5% 0·25W, R3390-GF02-01RG
TR110 collector load with R218 and TR109/TR113 base levels
R218 1kΩ 5% 0·25W, R4100-GF02-09RG
See R217
R219 1kΩ 5% 0·25W, R4100-GF02-09RG
TR111 collector load
R220 10kΩ 5% 0·25W, R5100-GF02-09RG
Line pulse integrator feed to TR108 base
R221 47kΩ 5% 0·25W, R5470-GF02-09RG
See R208 and R209
R222 10kΩ 5% 0·25W, R5100-GF02-09RG
Line pulse integrator, with C186
R223 1·2kΩ 5% 0·25W, R4120-GF02-09RG
TR111 base biasing, with RV224, R225 and R229
R225 33kΩ 5% 0·25W, R5330-GF02-09RG
See R223
R226 18kΩ 5% 0·25W,R5180-GF02-09RG
Set HT feedback compensation, with C187 and C188
R227 1·5kΩ 5% 0·25W, R4150-GF02-09RG
Line oscillates feed resistor to TR113 base (line driver)
R228 1·5kΩ 5% 0·25W, R4150-GF02-09RG
T103 primary damping (line driver transformer)
R229 39kΩ 5% 0·25W, R5390-GF02-09RG
See R223
R230 33Ω 5% 0·25W, R2330-GF02-09RG
T103 secondary tap damping
R231 143kΩ 1% 0·25W, (metal film), R6143-BM02-PH57
Set Beam limiter level bleed resistor with R232
R232 9·1kΩ 5% 0·5W, R4910-GF05-04RG
See R231
R233 470kΩ 5% 0·25W, R6470-GF02-09RG
Beam limiter feed from R231/R232 to TR114 base
R234 22kΩ 5% 0·25W, R5220-GF02-09RG
Contrast circuit feed from beam limiter
R235 27kΩ 5% 0·25W, R5270-GF02-09RG
Brightness control circuit feed from beam limiter
R236 33kΩ 5% 0·25W, R5330-GF02-09RG
Line pulse gating feed, with R241, to IC102 via C197

R237 47kΩ 5% 0·25W, R5470-GF02-09RG
Line pulse blanking feed resistor, with R240, to IC103 via C198
R238 47kΩ 5% 0·25W, R5470-GF02-09RG
See R204
R239 47kΩ 5% 0·25W, R5470-GF02-09RG
See R204
R240 47kΩ 5% 0·25W, R5470-GF02-09RG
See R237
R241 33kΩ 5% 0·25W, R5330-GF02-09RG
See R236

**When RV174 (Frame Hold) is fitted R116 becomes 562kΩ, part number R6562-BM02-08RG*

†*Replaced by C200 in later production*

VARIABLE RESISTORS

RV113 16mm rotary pot. 10kΩ lin. (with PCC tags), 00E1-127-510-ZA1
Volume control
RV129 4·7kΩ lin. 10mm hor. preset pot., 00E1-131-447-PH1
Line hold adjustment
RV133 16mm rotary pot. 10kΩ lin. (with PCC tags), 00E1-127-510-ZA1
Brightness control
RV141 4·7kΩ lin. 10mm hor. preset pot., 00E1-131-447-PH1
Preset Brightness adjustment
RV147 16mm rotary pot. 10kΩ lin. (with PCC tags), 00E1-127-510-ZA1
Contrast control
RV150 16mm rotary pot. 10kΩ lin. (with PCC tags), 00E1-127-510-ZA1
Colour control
RV166 2·2kΩ lin. 10mm hor. preset pot., 00E1-131-422-PH1
Gain adjustment for Delay line amp
RV174 68kΩ Preset pot., 00E1-134-568-A01
Frame hold control. Available as a small PCB assembly, including R116, under part number 01V6-169-001
RV179 4·7kΩ lin. 10mm hor. preset pot., 00E1-131-447-PH1
APC potentiometer
RV180 1kΩ lin. 10mm hor. preset pot., 00E1-131-410-PH1
Burst phase adjustment
RV202 100Ω lin. 10mm vert. preset pot., 00E1-095-310-PH2
Height adjustment
RV224 470Ω lin. 10mm hor. preset pot., 00E1-131-347-PH1
Set HT (95V rail)
– Focus potentiometer, part of LOPT
– A1 potentiometer, part of LOPT

CAPACITORS

C100 6·8pF ±0·5pF 50V, C1680-HH250-MAJ4
Sound stability (IC102, pin 8)
C101 100nF 20% 63V, C6100-WW263-17CG
Tuning voltage decoupling
C102 4·7μF 20% 50V Elec., CE147-MS250-10CG
AFC adjacent channel anti-lockout
C103 4·7μF 20% 50V Elec., CE147-MS250-10CG
AFC time constant
C104 18pF 5% 50V, C2180-GG250-MAJ4
IF preamp input coupling
C105 39pF 5% 50V, C2390-GG250-MAJ5
Bottom end coupling
C106 10nF +80% −20% 50V, C5100-EW250-MAK3
IF preamp input coupling
C107 1μF 20% 50V Elec., CE110-MS250-10CG
RF AGC potential divider decoupling
C108 4·7μF 20% 50V Elec., CE147-MS250-10CG
AGC decoupling for IC101
C109 10nF +80% −20% 50V, C5100-EW250-MAK3
12V HF decoupling between IC101 and IC102
C110 22nF 10% 63V, C5220-SS263-17CG
Line flyback integration with R106
C111 10nF +80% −20% 50V, C5100-EW250-MAK3
Impedance matching, SF1011 output, with R110
C112 220nF 2·5% 63V, C6220-AA263-RBF5
IC102 pin 1, field osc. external tuning, with R116 and RV174
C113 390pF 5% 630V, C3390-GG363-RBF9
6MHz quadrature coil (L104) tuning, with R112
C114 10nF +80% −20% 50V, C5100-EW250-MAK3
IC102 pin 13 d.c. blocking and 6MHz coupling
C115 100nF +80% −20% 16V, C6100-EW216-MAK6
IC102 pin 14 HF decoupling
C116 10nF +80% −20% 50V, C5100-EW250-MAK3
Flashover immunity capacitor
C117 100μF 20% 16V Elec., CE310-MS216-10CG
12V line decoupling, to IC102
C118 150pF 5% 50V, C3150-GG250-MAK5
Part of 6 MHz rejector, with L106, C119 and R123
C119 150pF 5% 50V, C3150-GG250-MAK5
See C118
C120 1nF 10% 50V, C4100-SS250-MAH3
Intercarrier sound coupling to IC102 pin 15
C121 10nF +80% −20% 50V, C5100-EW250-MAK3
IF amplifier HF decoupling, IC102 pin 18
C122 100pF – Part of L105 can assembly
Vision carrier coil tuning
C123 180pF 5% 50V, C3180-GG250-MAJ8
Part subcarrier trap, with L108
C124 2·7nF 5% 160V, C4270-GG316-RBF9
Line osc. external tuning, with R128 and RV129 (IC102 pin 23)
C125 68nF 10% 63V, C5680-SS263-17CG
Part line osc. external loop filter with C130 and R131, IC102 pin 25 (flywheel sync storage)
C126 22pF 5% 50V, C2220-GG250-MAJ4
Part chroma bandpass circuit, with C128, L109, R151 and R157
C127 4·7μF 20% 50V Elec., CE147-MS250-10CG
Part AGC gating external time-constant with R140
C128 68pF 5% 50V, C2680-GG250-MAJ7
See C126
C129 68nF 10% 63V, C5680-SS263-17CG
Sync separator clipper time constant, with R130 and R139
C130 10μF 20% 50V Elec., CE210-MS250-10CG
See C125
C131 220nF 5% 63V, C6220-GG263-17CG
Coincidence detector time constant, with R132 (on AV with R138)
C132 10μF 20% 50V Elec., CE210-MS250-10CG
IC103 pin 4 decoupling (brightness circuit)
C133 47μF 20% 16V Elec., CE247-MS216-10CG
12V supply decoupling with R144, to IC102
C134 100nF +80% −20% 16V, C6100-EW216-MAK6
12V supply HF decoupling
C135 4·7μF 20% 50V Elec., CE147-MS250-10CG
Pedestal clamp and video amplifier decoupling, IC103 pin 3
C136 10μF 20% 50V Elec., CE210-MS250-10CG
Luma input d.c. blocking to IC103 pin 5
C137 18pF 5% 50V, C2180-GG250-MAJ4
Video amplifier frequency compensation, IC103 pin 6
C138 1μF 20% 50V Elec., CE110-MS250-10CG
Contrast control decoupling, IC103 pin 7
C139 1μF 20% 50V Elec., CE110-MS250-10CG
Colour control decoupling, IC103 pin 8
C140 10nF +80% −20% 50V, C5100-EW250-MAK3
IC103 pin 10 decoupling (chroma amp)
C141 10nF +80% −20% 50V, C5100-EW250-MAK3
Chroma coupling and d.c. blocking to ACC amp (IC103, pin 11)
C142 1μF 20% 50V Elec., CE110-MS250-10CG
ACC time constant, with R153
C143 470nF 20% 50V Elec., CE047-MS250-10CG
Killer bias decoupling, IC103 pin 13
C149 22pF – Part of L105 can assembly
Vision carrier coil tuning
C150 10nF +80% −20% 50V, C5100-EW250-MAK3
Part of chroma delay line matrix drive circuit
C151 39pF 5% 50V, C2390-GG250-MAJ5
Broad bandpass filter, with L111
C152 10nF +80% −20% 50V, C5100-EW250-MAK3
Delay line amplifier amplitude control coupling to emitter TR102
C154 18pF 5% 50V, C2180-GG250-MAJ4
Phase shift circuit, with R173, C155
C155 47pF 5% 50V, C2470-GG250-MAJ6
VCO phase shift, with C154 and R173
C156 47pF 5% 50V, C2470-GG250-MAJ6
4·43 MHz oscillator frequency correction
C157 22nF +80% −20% 50V, C5220-EW250-MAK4
APC balance current feed, with R175, R177 and C159
C158 4·7μF 20% 50V Elec., CE147-MS250-10CG
4·43 MHz filter, with R178
C159 22nF +80% −20% 50V, C5220-EW250-MAK4
See C157
C160 100pF 5% 50V, C3100-GG250-MAJ7
Part of burst phase adjustment network, with C161 and L110
C161 47pF 5% 50V, C2470-GG250-MAJ6
See C160
C162 1nF 10% 500V, C4100-SS250-MAK1
See R171
C163 3·9nF 10% 500V, C4390-SS350-MAK2
See R171
C165 47μF 20% 16V Elec., CE247-MS216-10CG
Audio amp coupling from IC102
C166 100nF 5% 63V, C6100-GG263-17CG
Part de-emphasis network, with R181 and R182
C167 100nF +80% −20% 16V, C6100-EW216-MAK6
Audio output frequency compensation
C169 100μF 20% 25V Elec., CE310-MS225-10CG
Loudspeaker coupling
C170 10nF +80% −20% 50V, C5100-EW250-MAK3
33V tuning voltage HF decoupling
C171 47μF 100V Elec., CE247-MS310-RYD3
Field scan a.c. coupling
C172 4·7μF 20% 50V Elec., CE147-MS250-10CG
Field output stage a.c. feedback coupling
C174 470nF 10% 63V, C6470-SS263-05CG
AF coupling (audio out from IC102 pin 12)
C179 100nF 20% 250V, C6100-WW325-05CG
D120 transient protection
C180 100nF 20% 250V, C6100-WW325-05CG
D123 transient protection
C181 2200μF 25V Elec., CE422-MS225-RYB1
Reservoir for 18V rail (unstabilized)
C182 10μF 20% 50V Elec., CE210-MS250-10CG
Smoothing capacitor for 12V regulator
C183 1000μF 100V Elec., CE410-MS310-RYF5
Reservoir for 85V rail (unstabilized)
C184 100pF 5% 50V, C3100-GG250-MAJ7
TR113 stabilizing
C185 1nF 10% 500V, C4100-SS350-MAK1
D109 transient protection
C186 2·7nF 5% 160V, C4270-GG316-RBF9
Line pulse integrator, with R222
C187 3·9nF 10% 500V, C4390-SS350-MAK2
Set HT feedback compensation, with R226 and C188
C188 1nF 10% 50V, C4100-SS250-MAH3
See C187
C189 22μF 20% 50V Elec., CE222-MS250-10CG
Boost reservoir (95V rail)
C190 22μF 160V Elec., CE222-MS316-RYF4
D115 reservoir (150V rail)
C191 22μF 160V Elec., CE222-MS316-RYF4
95V rail smoothing
⚠C193 330nF 10% 400V, C6330-SS340-RBD2
'S' correction
⚠C194 6·8nF 5% 1·5kV, C4680-GG415-RBF9
Line tuning capacitor
C195 100nF 20% 250V, C6100-WW325-05CG
Beam limiter decoupling
C196 47μF 20% 16V Elec., CE247-MS216-10CG
Provides appropriate decay time of beam limiter action
C197 100nF 20% 250V, C6100-WW325-05CG
Line pulse coupling, with R236
C198 10nF 10% 400V, C5100-SS340-04CG
Line blanking pulse coupling
C200 68pF 5% 50V, C2680-GG250-MAJ7
FL1 input coupling (was R122)

TRANSISTORS

TR101 BC238C, 00TR-002-204-1TG
Video invertor amplifier
TR102 BC307B, 00TR-004-203-1TG
Chroma delay line amp
TR104 TIP29E, 01V0-969
Field output with TR105
TR105 TIP112H, 01V0-968
See TR104
TR107 BD839, 08V1-399
Chopper switch for 95V rail regulation
TR108 BC338C, 00TR-008-104-1TG
Current summing amplifier and chopper switch driver
TR109 BC307B, 00TR-004-203-1TG
Overvoltage trip, with TR110 (150V rail)
TR110 BC238B, 00TR-002-203-1TG
See TR109
TR111 BC307B, 00TR-004-203-1TG
Error amp for 95V regulator
TR112 T9064V, 01V0-970
Line output
TR113 BC327B, 00TR-010-203-1TG
Line driver
TR114 BC307B, 00TR-004-203-1TG
Beam current limiter
TR120 BC307C, 00TR-004-204-1TG
Audio preamplifier

TR121 BC307C, 00TR-004-204-1TG
Active bias transistor for audio output transistor, with TR124 (prevents crossover distortion)
TR123 BD385, 08V1-398
Part audio output amplifier stage
TR124 BC238C, 00TR-002-204-1TG
See TR121
TR125 BC327A, 00TR-010-202-1TG
Part audio output amplifier stage

DIODES

D102 BZX83C4V7, 02V4-176-147
Blanking input clamp diode, IC103 pin 2
D103 BAV20, 00DD-002-001-1DG
Line pulse clipper, pins 19 and 23 of IC103
D106 IN4001, 00DP-001-001-1DG
Frame output clamp
D107 IN4001, 00DP-001-001-1DG
Frame 'totem' diode
D109 BYV95B, 03V4-148-200
95V rail isolating (part chopper switch)
D110 PH425, 00DD-001-001-1DG
TR108 *e-b* clamp
D111 BZX83C6V8, 02V4-176-168-200
TR111 emitter reference diode
D112 IN4001, 00DP-001-001-1DG
Offer drive bias for TR107
D113 IN4007GP, 00DP-007-001-1DG
Line scan efficiency diode
D114 BYV95B, 03V4-148-200
Boost diode, 95V supply
D115 BYV95B, 03V4-148-200
150V supply boost diode
D116 IN4004GP, 00DP-004-001-1DG
Beam limiter reference diode
D117 BAV20, 00DD-002-001-1DG
Field blanking clamp/frame d.c. shift
D118 BZX83C4V7, 02V4-176-147
Line pulse gating clamp diode, IC103 pins 19 and 23
D119 MVS460-2, 00V3-327
Tuning voltage regulator (32V rail)
D120 BY127, 02V4-178
Rectifier for 85V unstabilized supply with D123
D121 BY127, 02V4-178
Rectifier for 18V unstabilized supply with D122
D122 BY127, 02V4-178
See D121
D123 BY127, 02V4-178
See D120
D124 IN4004GP, 00DP-004-001-1DG
On/off switch monitoring diode for battery adaptor
D125 RGP10M, 01V4-786
Anti-saturation for line output transistor

INTEGRATED CIRCUITS

IC101 SL1432, 00V3-610
IF preamplifier (SAWF)
IC102 TDA4500, 00V3-638
IF and video detector, quadrature sound det., field and line processor
IC103 UPC1365C, 00V3-480
Luminance, chrominance and video processing
IC105 PC7812H, 00V3-600
12V regulator

INDUCTORS

L103 Preamp input coil, 90D0-163-TK1
Part of IF preamp input tuned circuit, with C104 and C105
L104 Sound quadrature coil, 90D0-202-001-TK1
Part of sound demodulator tank circuit
L105 Vision carrier coil, 90D0-203-001-TK1
Part of vision synchronous detector
L106 6MHz rejector coil, 90D0-198-001-TK1
Intercarrier sound trap (prevents sound on vision)
L108 4·4MHz rejector Mk.II, 90D0-098-TK
Prevents subcarrier patterning on tube screen
L109 Chroma filter, 00D0-915-001-TK1
Part of chroma bandpass network
L110 33µH 10% radial lead, L2330-SR000-TD01
Burst phase adjustment coil, with RV180, C160 and C161
L111 Post chroma delay line coil, 00D0-911-001
Part of delay line matrix for feeding R-Y and B-Y to appropriate synchronous detectors
L113 Pre-chroma delay line coil, 00D0-914-001
Chroma delay line input coil
L114 6·8µH 10% radial lead, L1680-SR000-TD01
Prevents half IF radiation from entering luma stages
L115 15µH 10% radial lead, L2150-SR000-TD01
Couples d.c. and blocks a.c.
L120 P.S.U. inductor, 90D4-104-001
Energy storage choke, 85V line
DL107 Luminance delay line, 00E5-966-TD1
Ensures that luma and chroma are in register
⚠**T101** Mains transformer, 90D3-035-002
Mains isolating (cabinet mounted)
⚠**T102** Diode split transformer, 00D4-235-002-HT1
Line output transformer and EHT rectifier combined
T103 Line driver transformer, 90D4-105-002
Provides coupling between TR113 and TR112

MISCELLANEOUS

DL112 Chroma delay line, 00E5-931-01G
64µs delay for PAL system
FL1 6 MHz ceramic filter, 00E5-953-MA1
Intercarrier sound selectivity
⚠**FS101-2** Fuse T1A time lag, 00E6-041-100-BK2
Mains primary and isolated secondary fusing
SK101 Earphone socket, 00F6-377-001
Mutes internal speaker, when used
SF101 SW153A, 00V3-639
IF surface acoustic wave filter
S101 Push-Push switch, 00E2-158-001
On/off switch
XL101 Crystal 4·43 MHz, 00E5-930-001-KK1
Reconstitutes chroma subcarrier from the burst signal
— 8-way tuning and selector switch assembly, 01M4-443-001
Programme selection and preset tuning
Z101 VDR P152/1R, 00E5-146-PD1
Set the AFC range (with R101 and R102)
Z102 VDR Dual PTC 120V PTH451C, 00E5-168-001
Provides degauss cycle

CRT Base Panel, PC1131

PCB Assembly, 01V6-131-001

RESISTORS

R902, R905, R930 47kΩ 5% 0·5W, R5470-GF05-04RG
TR901 collector load
R903, R904, R906 47kΩ 5% 0·5W, R5470-GF05-04RG
TR902 collector load
R907, R928, R929 47kΩ 5% 0·5W, R5470-GF05-04RG
TR903 collector load
R908 1·8Ω 10% 1·2W, R1180-ST01-CG12
CRT heater dropper
R909 2·7kΩ 10% 0·5W, R4270-SC05-10RG
Green gun flashover protection
R910 220Ω 5% 0·25W, R3220-GF02-01RG
TR901 base feed
R911 220Ω 5% 0·25W, R3220-GF02-01RG
TR902 base feed
R912 220Ω 5% 0·25W, R3220-GF02-01RG
TR903 base feed
R913 2·7kΩ 10% 0·5W, R4270-SC05-10RG
Blue gun flashover protection
R914 2·7kΩ 10% 0·5W, R4270-SC05-10RG
Red gun flashover protection
R915 680Ω 5% 0·25W, R3680-GF02-01RG
TR901 frequency compensation
R916 680Ω 5% 0·25W, R3680-GF02-01RG
TR902 frequency compensation
R917 680Ω 5% 0·25W, R3680-GF02-01RG
TR903 frequency compensation
R921 3·3kΩ 5% 0·25W, R4330-GF02-01RG
Green background setting with RV924
R922 3·3kΩ 5% 0·25W, R4330-GF02-01RG
Blue background setting with RV925
R923 3·3kΩ 5% 0·25W, R4330-GF02-01RG
Red background setting with RV926
R927 100kΩ 10% 0·5W, R6100-SC05-VM69
A1 flashover protection

VARIABLE RESISTORS

RV924-RV926 10kΩ lin. 10mm hor. preset pot., 00E1-131-510-PH1
Green, blue and red background adjustments

CAPACITORS

C902 270pF 5% 50V, C3270-GG250-MAK7
Frequency compensation, TR901
C903 270pF 5% 50V, C3270-GG250-MAK7
Frequency compensation, TR902
C904 270pF 5% 50V, C3270-GG250-MAK7
Frequency compensation, TR903
C905 10nF +80% −20% 2kV ceramic disc, C5100-EW420-MAK8
A1 decoupling

TRANSISTORS

TR901-3 BF460, 00TR-020-801
Video output transistors

MISCELLANEOUS

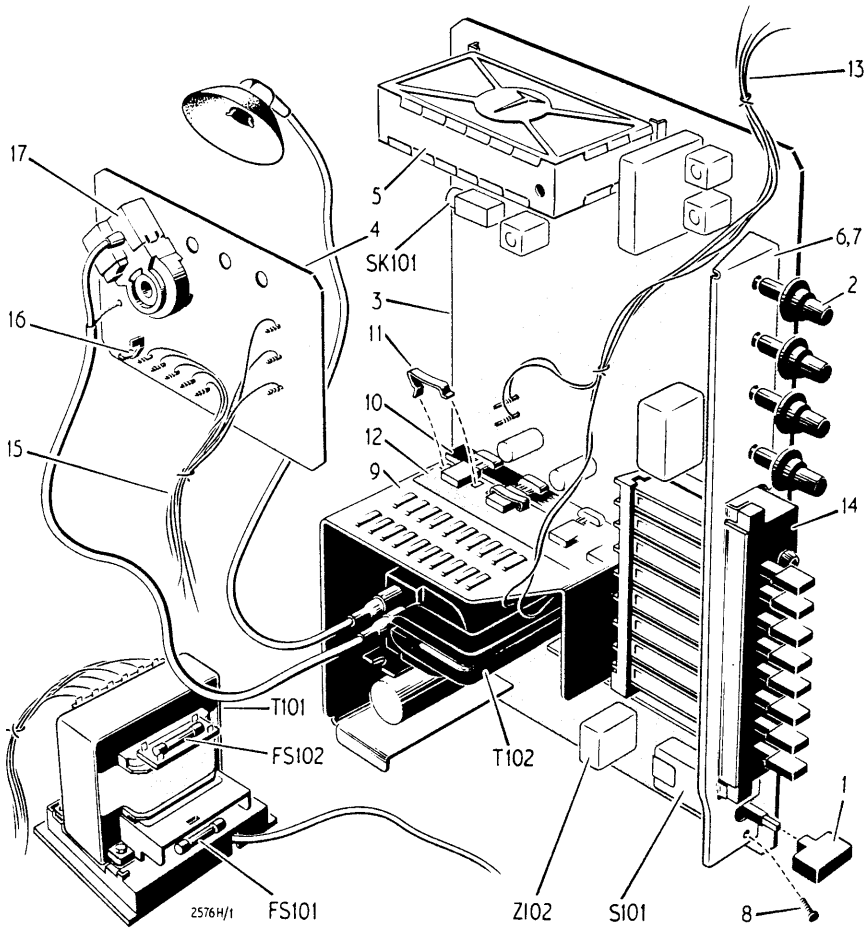
SG901-5 Spark gaps, Part of minineck CRT holder, 00F6-386-001
CRT cathodes, A1 and focus flashover protection

CHASSIS REPLACEMENT PARTS

When ordering replacements quote model number, reference number (with G prefix), description and part number. Items with circuit references (shown in the illustration), are listed under Component Details.

G1	On/Off knob, 90C0-053-001
G2	Control knob, 90C0-054-001
G3	Main PCB assembly (PC1130), 01V6-130-001
G4	CRT PCB assembly (PC1131), 01V6-131-001
G5	UHF varicap tuner, 06M8-020-006
G6	Tuning control & switch bracket assembly incl. G7, G8, On/Off switch and four potentiometers, 90M4-522-001
G7	Control bracket, 90B1-273-002
G8	Screw securing On/Off switch, SY04-HP06
G9	Heatsink, 90B1-274-001
G10	Transistor mounting, 90C8-309-002
G11	Transistor clip, 00L4-136-001-01G
G12	Transistor pad, 90B4-111-001
G13	Line & Field scan lead assembly, 90G0-174-001
G14	8-way tuning selector switch assembly, 01M4-443-001
G15	Tube base lead assembly, 90G0-173-001
G16	Earth butterfly, 90B1-179-001
G17	CRT holder, 00F6-386-001

Illustrated items with circuit references are listed on page A10, except for the mains transformer items which are covered in the Individual Model Card.



MODIFICATIONS IN PRODUCTION (PC1130 and PC1131)

The following modifications have been introduced during the course of production.

Reference	Early Chassis	Later Chassis	Remarks
Z101	not fitted	P152/IR	Increase AFC range at top of UHF band
RV174*	not fitted	68kΩ preset	Frame Hold added to ensure field lock
R116*	590kΩ	562kΩ	Value reduced when RV174 is fitted
R188	not fitted	68Ω	Audio output level correction (fixed on copper side)
R171 R167	120kΩ 10kΩ	270kΩ 22kΩ	Reduces burst gate pulse duration to give improved performance with Sinclair Spectrum computer
R122	470Ω	68pF (C200)	Capacitor replaces resistor for improved performance with computer games and video recorders
D120 —D123	IN4004GP	BY127	Improved reliability
R213	47kΩ	51kΩ	Increased overvoltage threshold to prevent unwanted 'trip' action
C100	not fitted	6·8pF	Improves sound limiting
R232	12kΩ	9·1kΩ	Reduces interaction between Contrast & Brightness controls
RV924 —RV926	1kΩ	10kΩ	The preferred value is 10kΩ
R128	27kΩ	28kΩ	To centralize the range of the Line Hold control
R157 R151	1kΩ 820Ω	1·5kΩ 390Ω	Eliminates colour breakthrough on monochrome
R118	not fitted	100Ω	Added in series with IC102 pin 11 for flashover protection. Replaces link 121, near earphone socket

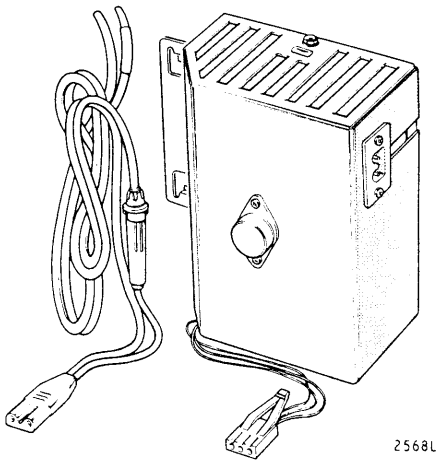
**Before the introduction of the Frame Hold adjustment, in a few receivers, an 18MΩ resistor was fitted underboard in parallel with R116 to prevent the picture running downwards. Where the speed was fast i.e., showing a slow roll up, a 10nF capacitor was fitted underboard, in parallel with C112.*

The preset, RV174, was initially fitted by soldering two legs of the pot to Link 123 and making a mid-air connection between the third leg of the pot and R116.

Subsequently the preset was mounted on a small sub-board which locates in the two holes left vacant by removing R116 and fitting this resistor on the sub board in series with the pot.

Battery Converter TA127A (Optional)

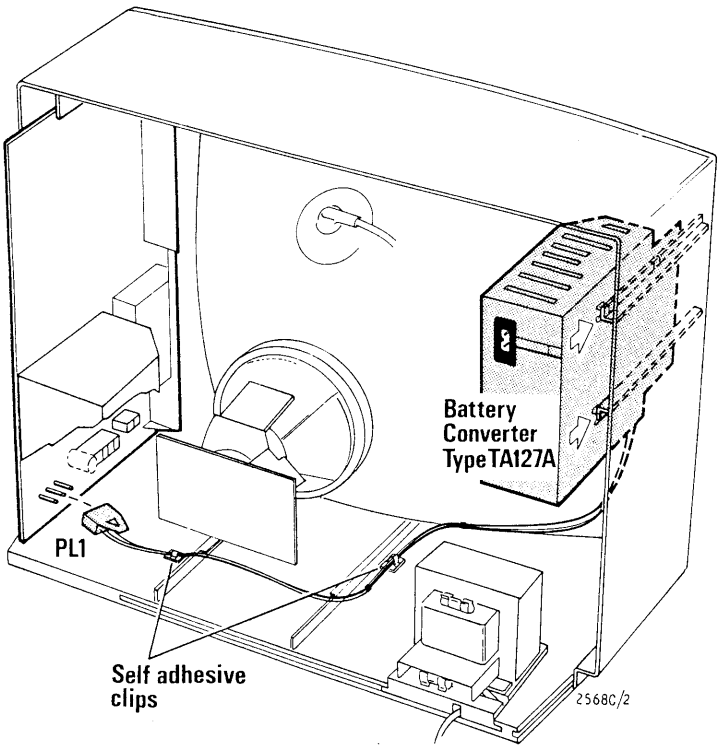
For use with TX90 portable Models



The unit will operate from a 12V or 24V battery without the need for any adjustments. Changeover from mains to battery operation is entirely automatic– when the mains and battery supplies are both present the receiver will operate from the mains. If there is no mains supply it will operate from the battery. The receiver On/Off switch is operational for mains and for battery use.

The unit is also suitable for use with remote control models, but the Standby facility will be inoperative.

Fitting Instructions



The TA127A is fitted inside the cabinet and is supplied with a plug-in connecting lead and in-line fuse holder. The fuse is a 32mm car type 6·3A. The red sleeved wire must be connected to battery positive. If additional connecting lead is required, the conductors should be at least 2·5mm² to ensure minimum voltage drop in the lead.

1 Unplug loop aerial and remove cabinet back - four screws.

2 Slide converter unit onto guide rails on side of cabinet.

3 Plug the converter connecting lead onto the three pins and arrange the lead as shown, using the self-adhesive clips supplied.

4 Carefully remove the break-out portion of the cabinet back to give access to the converter socket.

5 Secure cabinet back and plug in aerial.

SPECIFICATION

Input Voltage Range

10·5V to 30V, i.e., 12V or 24V nominal battery input with no alterations being required to the unit.

Input Current

Approximately 3·5A at 12V and 2A on 24V.

Output Voltage

85V, nominal and 18V nominal, corresponding to the unstabilized HT lines on the TX90 chassis.

Current Consumption (approximate figures)

85V line: 400mA with 12V input
450mA with 30V input

18V line: 350mA with 12V input
300mA with 30V input

Fuses and Low Voltage Cutout

6·3A car type fuse in the battery positive lead giving reverse battery protection and one internal 1A fuse (20mm cartridge type) in the 85V line.

The converter includes a self-resetting cutout which operates when the battery voltage drops below about 10·5V, to protect the battery from excessive discharge.

COMPONENT DETAILS

When ordering replacements quote TA127A, component reference, description and part number.

Each description and part number is followed by the component function.

PCB Assembly, 01V6-129-001

CAPACITORS

C1 1nF 5% 630V, C4100-GG363-RBF9
Trigger oscillator timing capacitor

C2 10nF +80% −20% 50V, C5100-EW250-MAK3
Low voltage shutdown input decoupling, pins 10 and 11 of IC1

C3 220nF 20% 50V Elect., CE022-MS250-09CG
Mains status detector charge capacitor

C4 100nF +80% −20% 16V disc, C6100-EW216-MAK6
85V HT feedback decoupling hold-off circuit, pin 6 of IC1

C5 1nF 10% 50V, C4100-SS250-MAH3
Hold-off circuit timing, with R10

C6 2200µF 50V Elec., CE422-MS250-RYF8
12V-35V battery lead decoupling

C7 47nF 20% 63V, C5470-WW263-17CG
Trigger pulse differentiator, with R16

C8 220µF 20% 35V Elec., CE322-MS235-21CG
16V supply smoothing

C9 4·7µF 135V Elec., CE147-MV313-RBC3
85V supply smoothing

C10 22µF 20% 35V, CE222-MS235-RYG8
Reverse drive base network, with R18, to TR4

C12 10nF +80% −20% 50V, C5100-EW250-MAK3
Anti 'spook'

INDUCTORS

L1 RFI input choke, 90D4-101-001
85V HT spook decoupling

T1 Inverter output choke, 90D4-106-003
Includes a winding for the 16V supply

T2 Current transformer, 90D4-107-001
TR4 base drive transformer

RESISTORS

R1 45·3kΩ 1% 0·25W, R5453-BM02-12RG
Shut-down potential divider, with R2

R2 56·2kΩ 1% 0·25W, R5562-BM02-12RG
See R1

R3 1MΩ 5% 0·25W, R7100-GF02-09RG
Feedback resistor in trigger oscillator, during start-up only

R4 470Ω 5% 0·25W, R3470-GF02-09RG
C1 discharge control resistor, in trigger oscillator

R5 68·1kΩ 1% 0·25W, R5681-BM02-PH57
C1 charge control resistor

R6 2·2kΩ 5% 0·25W, R4220-GF02-09RG
5·6V HT feed resistor to zener (D6)

R7 3·3kΩ 5% 0·25W, R4330-GF02-09RG
Trigger oscillator hysteresis level to pin 9 of IC1, with R8

R8 1kΩ 5% 0·25W, R4100-GF02-09RG
See R7

R9 82kΩ 5% 0·25W, R5820-GF02-09RG
Low voltage shut-down hysteresis level to pin 11 of IC1

R10 100kΩ 5% 0·25W, R6100-GF02-01RG
Hold-off timing resistor, with C5, on pin 7 of IC1

R11 10kΩ 5% 0·25W, R5100-GF02-09RG
TR1, TR2 base bias resistor

R12 10kΩ 5% 0·25W, R5100-GF02-09RG
Mains status On/off detector 'pull up' resistor

R13 220kΩ 5% 0·25W, R6220-GF02-01RG
Mains status On/off time-constant, with C3

R14 5·6kΩ 5% 0·25W, R4560-GF02-01RG
85V HT feedback potential divider, with R19

R15 470Ω 5% 0·25W, R3470-GF02-01RG
Input current limiting resistor to hold-off circuit, pin 7 of IC1

R16 100Ω 5% 0·5W, R3100-GF05-04RG
Trigger differentiator, with C7

R17 100Ω 5% 0·25W, R3100-GF02-01RG
TR4 base damping

R18 1Ω 10% 0·5W, R1100-SXP5-W69
Reverse base drive network to TR4, with C10

R19 10kΩ 5% 0·25W, R5100-GF02-09RG
See R14

R20 22kΩ 5% 0·25W, R5220-GF02-09RG
Determines C1 ramp starting volts, with R4

R21 47kΩ 5% 0·25W, R5470-GF02-09RG
5·6V zener (D6) top up resistor from 85V line

TRANSISTORS

TR1 BC337-25, 00TR-007-203-1TG
Forms Trigger Oscillator buffer, with TR2

TR2 BC327-25, 00TR-010-203-1TG
See TR1

TR3 ZTX750, 00V1-630
Reverse drive buffer

TR4 T9056V, 01V0-944
Output chopper transistor

DIODES

D1 Type 425, 00DD-001-201-1DG
Trigger reset diode

D2 Type 425, 00DD-001-201-1DG
Charge current gating diode, with D3

D3 Type 425, 00DD-001-201-1DG
See D2

D4 Type 425, 00DD-001-201-1DG
Regeneration diode

D5 Type 425, 00DD-001-201-1DG
Low voltage shutdown hysteresis level network diode

D6 ZPD5V·6 2%, 01V4-802
5·6V HT voltage reference zener

D7 Type 425, 00DD-001-201-1DG
Part of diode 'AND' circuit, with D8 and D9

D8 Type 425, 00DD-001-201-1DG
See D7

D9 Type 425, 00DD-001-201-1DG
See D7

D11 Type 425, 00DD-001-001-1DG
Part of mains status on/off detection

D12 1N4001, 00DP-001-001-1DG
16V earth return current diode

D13 P600A, 02V4-715
Reverse battery protection diode

D14 Type 425, 00DD-001-001-1DG
Hold-off circuit clamp

D15 PL75C (75V), 00V4-710-275
85V feedback diode

D16 RGP10B, 02V4-735
16V HT rectifier

D17 BY206GP, 03V4-102
Start-up pulse coupling to TR4 base

D18 RGP15D, 02V4-733
Part of forward base current feedback from T2

D19 RGP15D, 02V4-733
85V HT rectifier

D20 Type 425, 00DD-001-201-1DG
Determines C1 ramp starting volts with R4, R20

D21 BAV20, 03V4-154
Instability protection clamp diode

INTEGRATED CIRCUIT

IC1 LM339N, 00V3-642
Quad comparater

MISCELLANEOUS

FS1 Fuse F6A3, 00E6-052-630-WN1
Connected in series with battery + lead

FS2 Fuse T1A time lag, 00E6-041-100-01G
Protects 85V HT line

REPLACEMENT PARTS

Quote TA127A when ordering replacements

G1 Converter cover, 90B1-279-001

G2 Chassis/heatsink assembly, 90M4-554-001
(the above item includes G3 to G10)

G3 Converter chassis, 90B1-278-002

G4 Battery socket, 00F6-385-001

G5 Screw M3 x 10mm POZI PAN HD., SM30-TP10

G6 Nut for G5 (M3 FULLNUT), NFH-M30

G7 Shakeproof washer for G5, WSP-M30

G8 Screw S/T securing G3 to G4, SY04-HP04

G9 Silicon pad for G10, 00B4-403-001

G10 Transistor T9056V, 01V0-944
(insulating washers supplied with above item)

G11 PCB assembly, 01V6-129-001

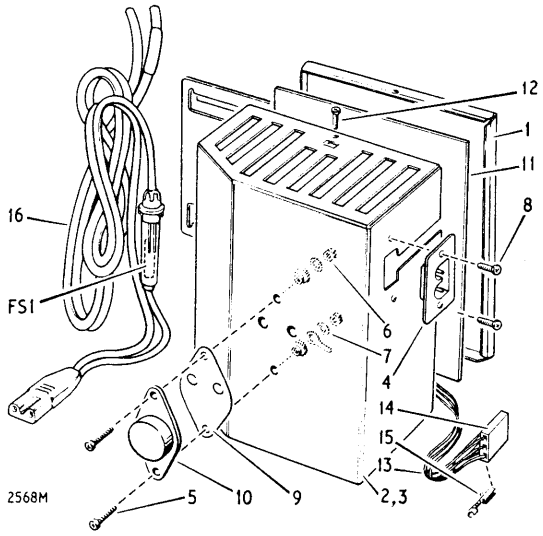
G12 Screw securing G1 to G2, ST06-HP04-01G

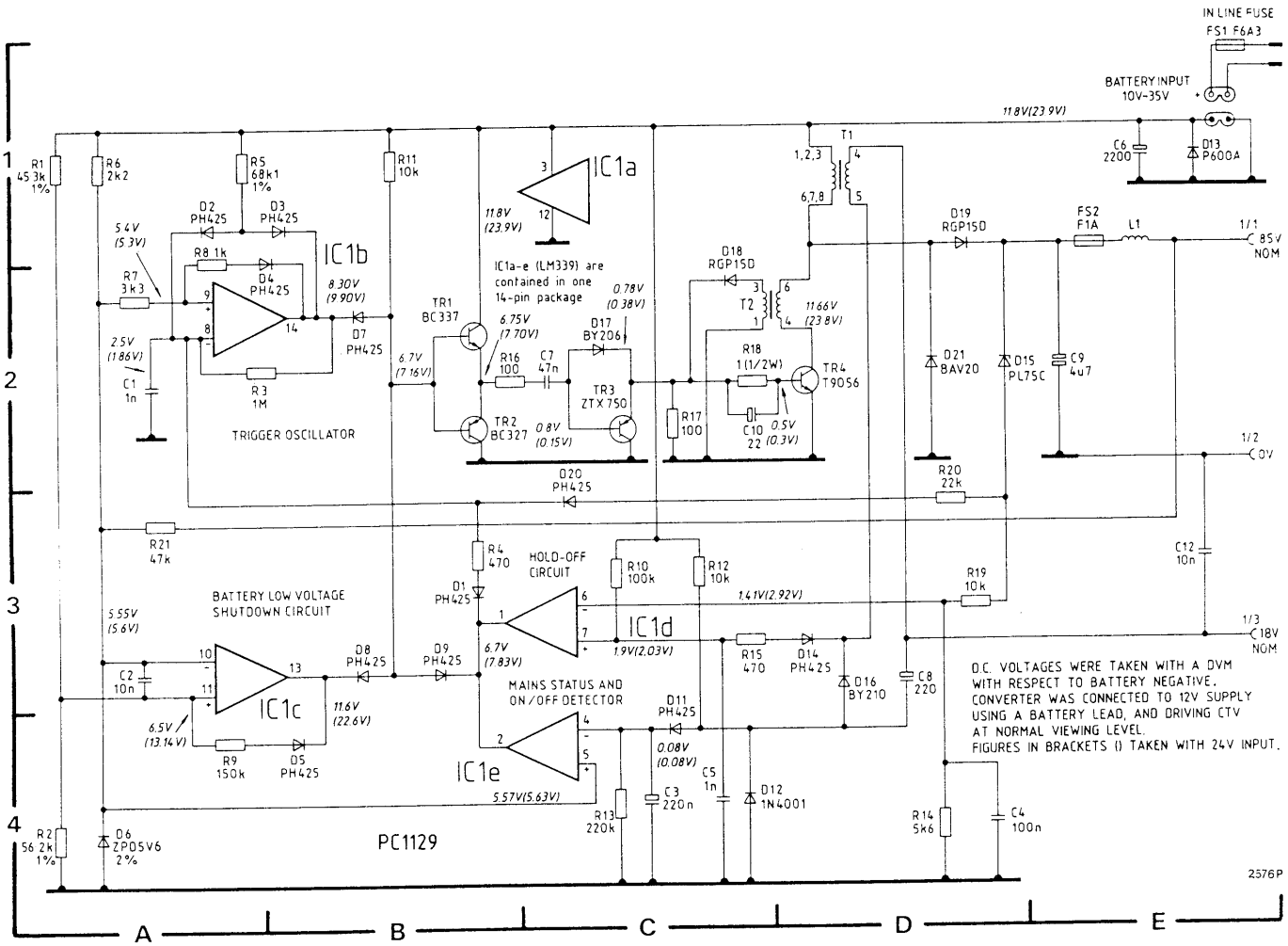
G13 Lead assembly, 90G0-172-001
(above item includes G14 and G15)

G14 3-way socket moulding (peg between pins 2 and 3), 00F6-339-N03-002

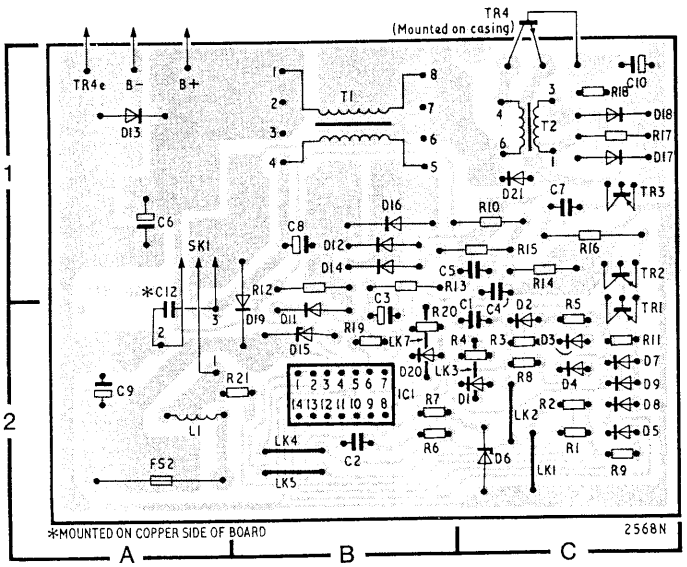
G15 Terminal (phosphor bronze), 00L1-121-001

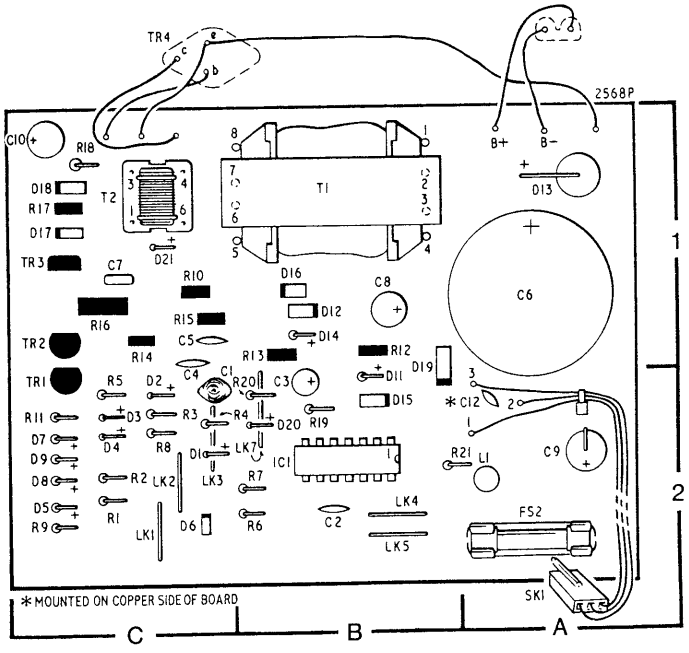
G16 Battery socket lead/fuse assembly, 01G0-159-001





TA127A Circuit Diagram





GRID REFERENCES

The circuit diagram location is followed by the printed panel location.

C1 ... A2,*C2*	**D1** ... B3,*C2*	**D14** ... D3,*B1*	**IC1** ... –,*B2*	**R9** ... A4,*C2*	**T1** ... D1,*B1*
C2 ... A3,*B2*	**D2** ... A1,*C2*	**D15** ... D2,*B2*		**R10** ... C3,*C1*	**T2** ... C2,*C1*
C3 ... C4,*B2*	**D3** ... B1,*C2*	**D16** ... D3,*B1*	**L1** ... E1,*A2*	**R11** ... B1,*C2*	
C4 ... D4,*C1*	**D4** ... A2,*C2*	**D17** ... C2,*C1*		**R12** ... C3,*B1*	**TR1** ... B2,*C2*
C5 ... C4,*C1*	**D5** ... B4,*C2*	**D18** ... C2,*C1*	**R1** ... A1,*C2*	**R13** ... C4,*B1*	**TR2** ... B2,*C1*
C6 ... E1,*A1*	**D6** ... A4,*C2*	**D19** ... D1,*B2*	**R2** ... A4,*C2*	**R14** ... D4,*C1*	**TR3** ... C2,*C1*
C7 ... C2,*C1*	**D7** ... B2,*C2*	**D20** ... C3,*B2*	**R3** ... A2,*C2*	**R15** ... C3,*C1*	**TR4** ... D2,*C1*
C8 ... D3,*B1*	**D8** ... B3,*C2*	**D21** ... D2,*C1*	**R4** ... B3,*C2*	**R16** ... B2,*C1*	
C9 ... E2,*A2*	**D9** ... B3,*C2*		**R5** ... A1,*C2*	**R17** ... C2,*C1*	**In battery lead*
C10 ... C2,*C1*	**D11** ... C4,*B2*	**FS1** ... E1,*	**R6** ... A1,*B2*	**R18** ... C2,*C1*	
C12 ... E3,*A2*	**D12** ... C4,*B1*	**FS2** ... E1,*A2*	**R7** ... A2,*B2*	**R19** ... D3,*B2*	
	D13 ... E1,*A1*		**R8** ... A1,*C2*	**R20** ... D3,*B2*	
				R21 ... A3,*B2*	

CIRCUIT NOTES

The unit is a variable frequency, variable mark-space ratio switch mode power supply.

Trigger Oscillator

One part of the Quad Comparator IC1 (pins 8, 9 and 14) and associated circuitry R3, R5 — R8, D2 — D4, D6 and C1 make up the trigger oscillator. When the output of the oscillator is high (pin 14), C1 begins to charge via D2 and R5. The Hysteresis control level is set by the voltage on pin 9 via R7 from the 5·6V reference diode, D6. As C1 charge reaches this level, the output switches low (pin 14), D4 conducts bringing Hysteresis level on pin 9 down via R8 to approximately 1V; simultaneously D3 conducts holding R5 down. C1 stops charging via D2 and discharge begins through R3.

When the Hysteresis level is reached, the output (pin 14) switches high, the whole cycle starting once again. The start up oscillations are squarewave with a low mark-space ratio of approximately 750 Hz.

Once the converter is working the oscillator discharge time is altered via R4 and D1 (see Regulation).

Power Stage

The trigger oscillator drives, via D7, a push-pull buffer stage TR1 and TR2 which is biased by R11. R16 and C7 provide differentiation into D17 and TR3 (reverse drive buffer) coupling start-up pulses into TR4 base-emitter junction. TR4 is a power transistor requiring a large base current. This is achieved by a current feedback transformer, T2, in conjunction with the start up pulse, which drives the transistor into a highly saturated condition. R17 provides damping against excess ringing being fed into TR4 base.

When TR4 is fully saturated TR3 (reverse drive buffer transistor) conducts, removing all the bias from TR4 very quickly. Regenerative action now takes place.

As TR4 switches on and off T1 primary acts as a choke producing high voltage pulses, which are rectified by D19 and smoothed by C9 to give an 85V output. The secondary tapping of T1 provides reduced voltage pulses which are rectified by D16 and smoothed by C8 to give the 16V output.

Regulation

The 85V Regulation is achieved by the 'Hold-off' section of IC1 (pins 1, 6 and 7) together with associated circuitry R10, R14, R19, C4, C5, D14 and D15. The voltage at the inverting input of IC1 (pin 6) is kept at a level determined by the potential divider chain D15, R19 and R14 whilst C4 provides HF decoupling.

Pin 7 of IC1 is controlled by the charge on C5, e.g. when TR4 is non-conducting, the junction of D14 and D16 rises ensuring D14 is switched off, C5 now charges up through R10 and the output of the 'Hold off' circuit (pin 1) goes high.

When TR4 conducts, the junction of D14 and D16 pulls down to —1·2V, D14 conducts and C5 discharges through R15 (current limiting resistor). When the threshold, determined by the potential on pin 6, is reached, the 'Hold off' output, pin 1, goes low. D1 conducts and C1 is discharged very rapidly through R4, thus oscillator speed increases. The mark-space ratio is determined by the time taken to reach the voltage at pin 6, which is monitoring the 85V line. A high output voltage on the 85V line lengthens the mark-space ratio reducing power output, ensuring regulation. To assist the stabilization of frequency under varying load conditions R20 and D20 have been provided. These components assist the discharge of C1 in the oscillator section once the 85V line is established.

Mains Status and On/Off Detection

This circuit monitors the TX90 input state across D124 on the PC1130 panel, and brings about shutdown of the Battery Converter when not required. This occurs when the television receiver On/Off switch is *off*, or when the a.c. mains supply is connected.

When the receiver is switched on with no a.c. mains supply, D11 and D12 junction is at —0·6V, which holds off D11 from conducting. If the television receiver is now switched off, no current is being drawn, the voltage at D11, D12 junction rises through R12 pull up resistor. D11 conducts, charging C3 and switching Mains Status On/Off detector pin 2 low. D9 and D1 conduct, effectively shutting down the battery Converter.

If the receiver is switched on with mains and battery Converter supplies both connected, the 18V line is blocked during the negative-going half cycles of the mains. As a result 100Hz pulses appearing at the junction of D11 and D12 are peak detected by D11, C3 and R13, producing a high on pin 4 of IC1. Pin 2 then goes low, D1 and D9 conduct shutting down the Converter.

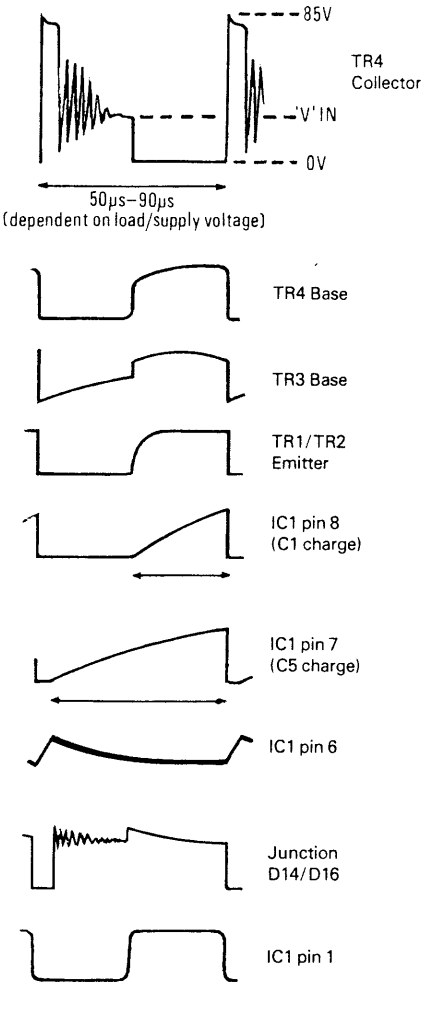
12V Battery Low Voltage Shutdown

As the title suggests this circuit works only when the Battery Converter is working on a 12V supply. The remaining quarter of IC1 (pins 10, 11 and 13) and associated components R1, R2, D9, D5, D8 and C2 form the low voltage shutdown. The 5·6V reference line (which is topped up by the 85V line via R21) is connected to pin 10, whilst R1 and R2 potential divider monitors the fixed portion of the supply volts, with C2 decoupling the input pins (10 and 11).

When the battery volts fall below the required working level, R1 and R2 potential divider falls proportionally, when below the 5·6V level the output pin 13 goes low causing shutdown of the Battery Converter via D8. Hysteresis components D5 and D9 prevent switching on and off rapidly at this point (due to rise in supply volts when current is reduced).

Battery Protection

D13 provides protection against reverse battery connection by causing FS1 6·3 Amp. fuse to rupture, if this is attempted. C6 provides input lead decoupling for the supply voltage.



Battery Converter Waveforms

INSTALLATION

Power Supplies

The receiver is fully isolated and suitable for a.c. mains connection 220V - 250V, 50Hz. Provision is made for add-on Battery Converter, Type TA127.

Two 20mm cartridge type fuses are mounted on the mains transformer rated at T1A (primary) and T1A6 (secondary).

Input power requirement is less than 40W at black level.

Setting 95V HT line, RV224

1. Turn **Brightness, Contrast** and **Colour** Controls to minimum to obtain a dark screen, i.e. zero beam current—if necessary turn the **A1** preset to minimum to achieve this.

2. Connect the meter (100V range) to pin 5 of the line output transformer and if necessary adjust **RV224** to give 95V. (This control also presets the EHT.)

Channel Tuning and Memory

The tuning-in procedure is fully described in Section B.

Line Hold, RV129

1. Fit a link between pin 28 of IC102 and earth.

2. Fit a 2.7kΩ resistor between pin 7 of IC102 and pin 26 of IC102.

3. Adjust **RV129** for a floating picture.

4. After removing the shorting link and the resistor the picture should lock.

Frame Hold

This preset is adjusted at the factory, and normally should not require readjustment in service.

If adjustment becomes necessary proceed as follows:

1. Disable the sync separator by linking across R139.

2. Connect an oscilloscope or counter to the cathode of D117 and adjust **Field Hold, RV174** for 45Hz.

3. Remove the link from R139.

An alternative method, in the absence of suitable test equipment, would be to rotate the preset first in one direction and then in the opposite direction noting the two positions where the frame breaks. Leave the control set midway between these two points.

Picture Height, RV202

Adjust for full vertical scan consistent with a correctly proportioned picture.

Focus

Adjust for optimum overall resolution.

Preset Brightness and Grey-Scale

1. Mute the video by connecting a 470Ω resistor between the 12V rail and pin 16 of IC102.

2. Turn the **Brightness** control to mid position. Turn the **Contrast** and **Colour** controls also the **Preset Brightness, Background** and **A1** presets all fully anticlockwise, i.e. for minimum screen brightness.

3. Check the collector voltage on any one of the video output transistors (expect 145-155V).

4. Adjust the **Preset Brightness, RV141** until above voltage drops by 5V.

5. Adjust each **Background** preset in turn for 125V on the associated video output transistor collector.

6. Collapse the field by placing a link across field deflector coils.

7. Adjust the **A1** preset until a line is just visible on the screen.

8. Adjust the **Background** presets for a white line on the screen, i.e. bring up the two low colours.

9. Remove resistor and restore raster.

10. Adjust the customer controls for normal reception.

The manufacturers reserve the right to vary specifications or use alternative materials as may be deemed necessary or desirable at any time.

ALIGNMENT

Equipment Required

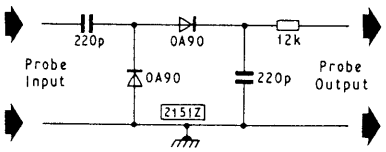
1. An IF wobbulator with markers.

2. An oscilloscope capable of displaying 100mV at 6MHz.

3. Non-metallic trimming tools.

4. A multirange meter (20kΩ/V) such as the Avometer Model 8.

5. A detector probe such as the one shown.



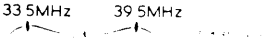
Tuner IF Out and L103

Wobbulator Method

1. Connect the IF wobbulator output lead between pin 9 of the tuner and earth. Connect the input of the detector probe to pin 3 of IC101 and the probe output to the oscilloscope. Link pins 20 and 21 of IC102.

2. Set the wobbulator centre-frequency to 36.5MHz and the output to maximum, and switch on the receiver. Adjust the wobbulator 'Y' gain to give a full scale display. Switch on markers at 39.5MHz and 33.5MHz. Adjust the tuner IF output coil and the input coil L103 (bandpass) for a symmetrical response centred on 36.5MHz as shown in the diagram.

The markers should be no more than 1dB down the slope. No further adjustments are necessary.



into the oscilloscope 'Y' amplifier, set to d.c. Link pins 20 and 21 of IC102.

2. Set the signal generator to 36.3MHz. Turn up the generator output and adjust the scope 'Y' amplifier gain for a satisfactory indication (shift of trace). Remove L103 input coil core. Adjust the tuner IF coil for maximum output at 36.3MHz. Insert L103 input coil core. Set the signal generator to 33MHz. Tune L103 for maximum output.

(Note: L103 has 2 peaks, the correct one leaves the core below former and can top.)

Switch off the receiver and disconnect the probe and link.

Carrier/AFC Coil, L105

1. Unplug Aerial.

2. Enable AFC.

3. Inject 39.5MHz carrier into tuner test point pin 9 (loosely couple generator to tuner).

4. Connect the meter (10V d.c. range) to pin 17 of IC102.

5. Adjust L105 for 6V reading.

Sound Peak Detector Coil, L104

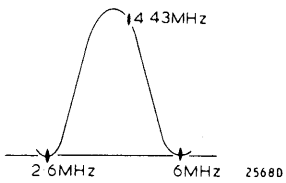
1. Mute the sound by removing the aerial.

2. Note voltage on pin 12 of IC102 (meter set to 10V d.c. range).

3. Refit aerial ensuring that the receiver is tuned to a programme and set the Volume control to maximum.

4. Set the d.c. voltage on pin 12 of IC102 for the same voltage as before by adjusting L104.

4. Adjust L106 for minimum 6MHz and L109 for maximum 4.43MHz as shown



Spot Frequency Method

1. Connect the oscilloscope across R151.

2. Inject 6MHz to junction of C200/FL1.

3. Adjust L106 for minimum display.

4. Remove signal generator and tune to an off-air colour transmission.

5. Adjust L109 for maximum burst amplitude on display.

Chrominance Adjustments

The following setting up instructions are carried out using a Colour Bar Generator incorporating colourless area information.

Where applicable, alternative procedures are given using an off-air colour bar signal or generator without colourless area information.

1. Decouple pin 16 of IC103 to chassis to remove burst (0.1μF capacitor can be used.)

2. Disable colour killer by linking across R156.

3. Reduce signal strength until picture is 'noisy'. Adjust RV179 to obtain locked colour on the screen.

4. Remove decoupling from pin 16 and link from R156.

5. Connect oscilloscope at red video output (junction TR903/R914) and inject a colour bar signal.

6. Turn Colour control (RV150) to

Preset Brightness and Grey-Scale

1. Mute the video by connecting a 470Ω resistor between the 12V rail and pin 16 of IC102.

2. Turn the **Brightness** control to mid position. Turn the **Contrast** and **Colour** controls also the **Preset Brightness, Background** and **A1** presets all fully anticlockwise, i.e. for minimum screen brightness.

3. Check the collector voltage on any one of the video output transistors (expect 145-155V).

4. Adjust the **Preset Brightness, RV141** until above voltage drops by 5V.

5. Adjust each **Background** preset in turn for 125V on the associated video output transistor collector.

6. Collapse the field by placing a link across field deflector coils.

7. Adjust the **A1** preset until a line is just visible on the screen.

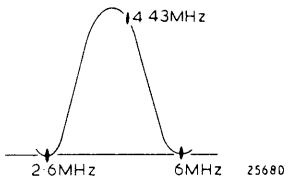
8. Adjust the **Background** presets for a white line on the screen, i.e. bring up the two low colours.

9. Remove resistor and restore raster.

10. Adjust the customer controls for normal reception.

The manufacturers reserve the right to vary specifications or use alternative materials as may be deemed necessary or desirable at any time.

4. Adjust L106 for minimum 6MHz and L109 for maximum 4.43MHz as shown



Spot Frequency Method

1. Connect the oscilloscope across R151.

2. Inject 6MHz to junction of C200/FL1.

3. Adjust L106 for minimum display.

4. Remove signal generator and tune to an off-air colour transmission.

5. Adjust L109 for maximum burst amplitude on display.

Chrominance Adjustments

The following setting up instructions are carried out using a Colour Bar Generator incorporating colourless area information.

Where applicable, alternative procedures are given using an off-air colour bar signal or generator without colourless area information.

1. Decouple pin 16 of IC103 to chassis to remove burst (0.1μF capacitor can be used.)

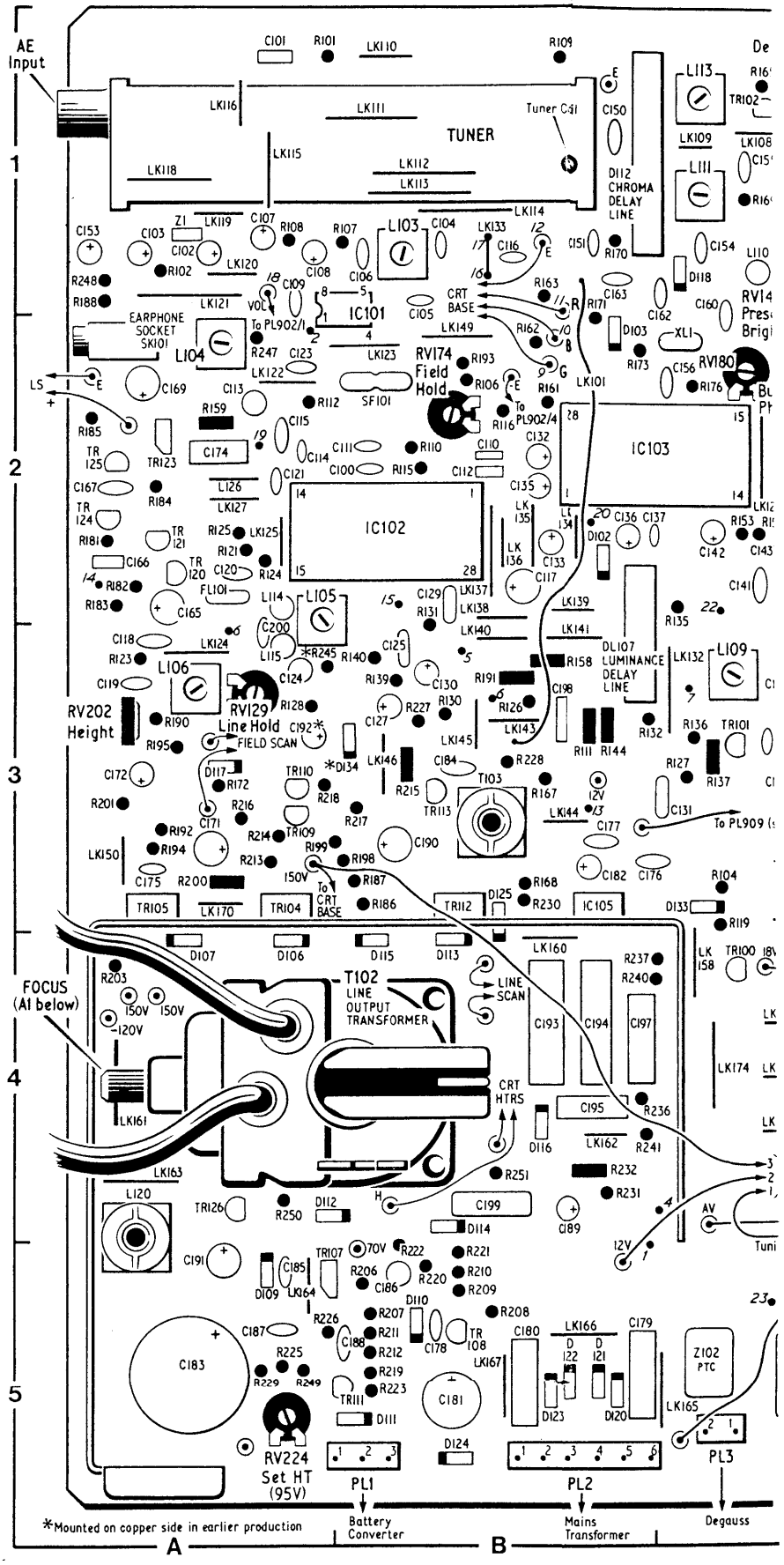
2. Disable colour killer by linking across R156.

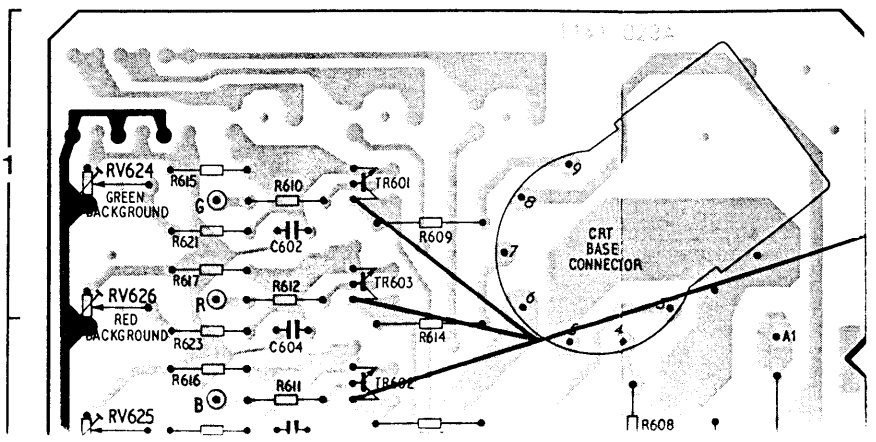
3. Reduce signal strength until picture is 'noisy'. Adjust RV179 to obtain locked colour on the screen.

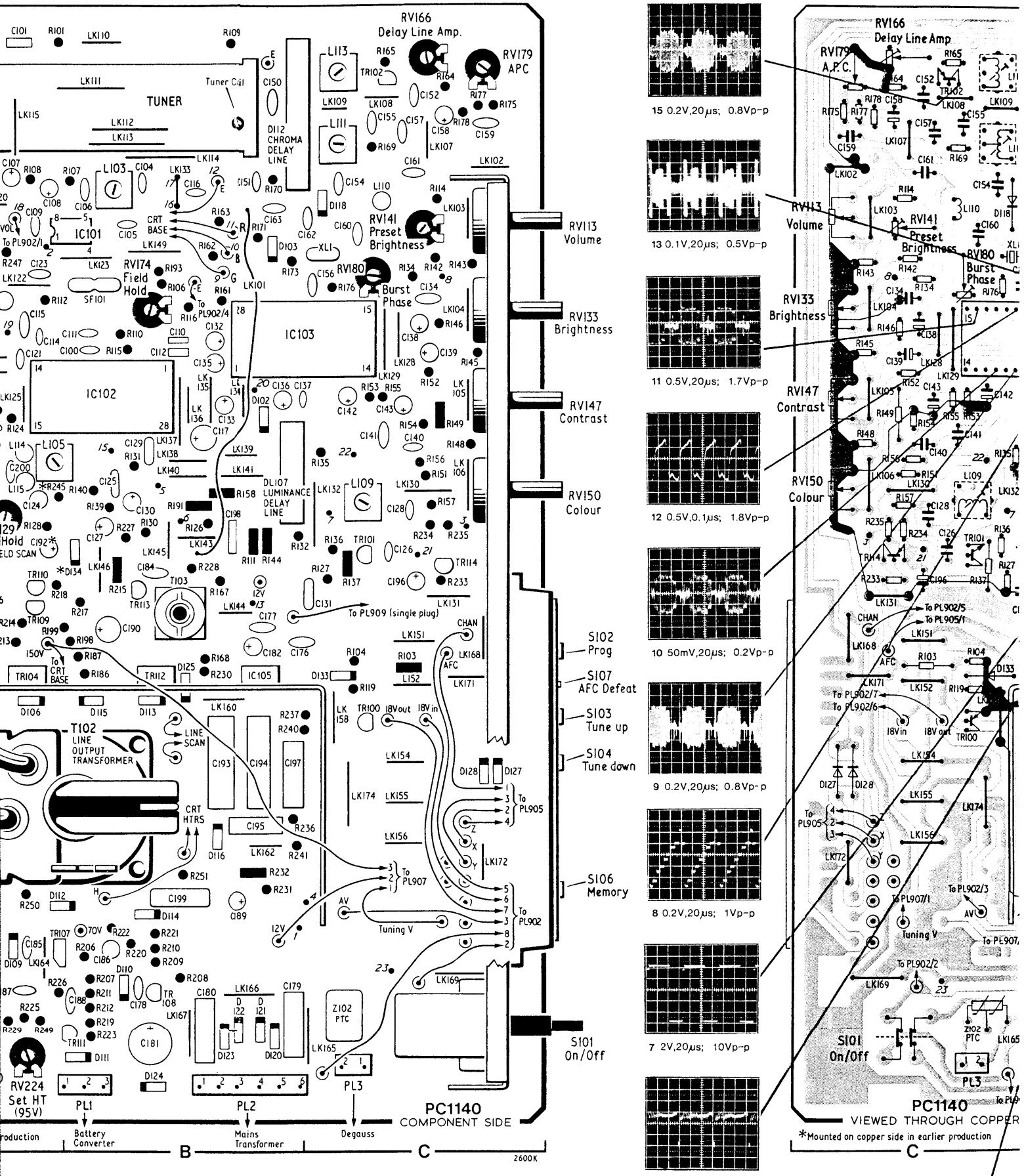
4. Remove decoupling from pin 16 and link from R156.

5. Connect oscilloscope at red video output (junction TR903/R914) and inject a colour bar signal.

6. Turn Colour control (RV150) to







15 0.2V,20µs; 0.8Vp-p

13 0.1V,20µs; 0.5Vp-p

11 0.5V,20µs; 1.7Vp-p

12 0.5V,0.1µs; 1.8Vp-p

10 50mV,20µs; 0.2Vp-p

9 0.2V,20µs; 0.8Vp-p

8 0.2V,20µs; 1Vp-p

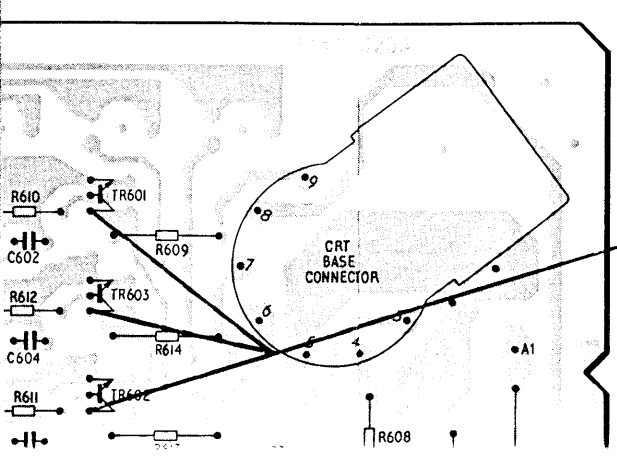
7 2V,20µs; 10Vp-p

6 50mV,20µs; 0.15Vp-p

16 20V,20µs; 96Vp-p

23 200V,20µs; 80

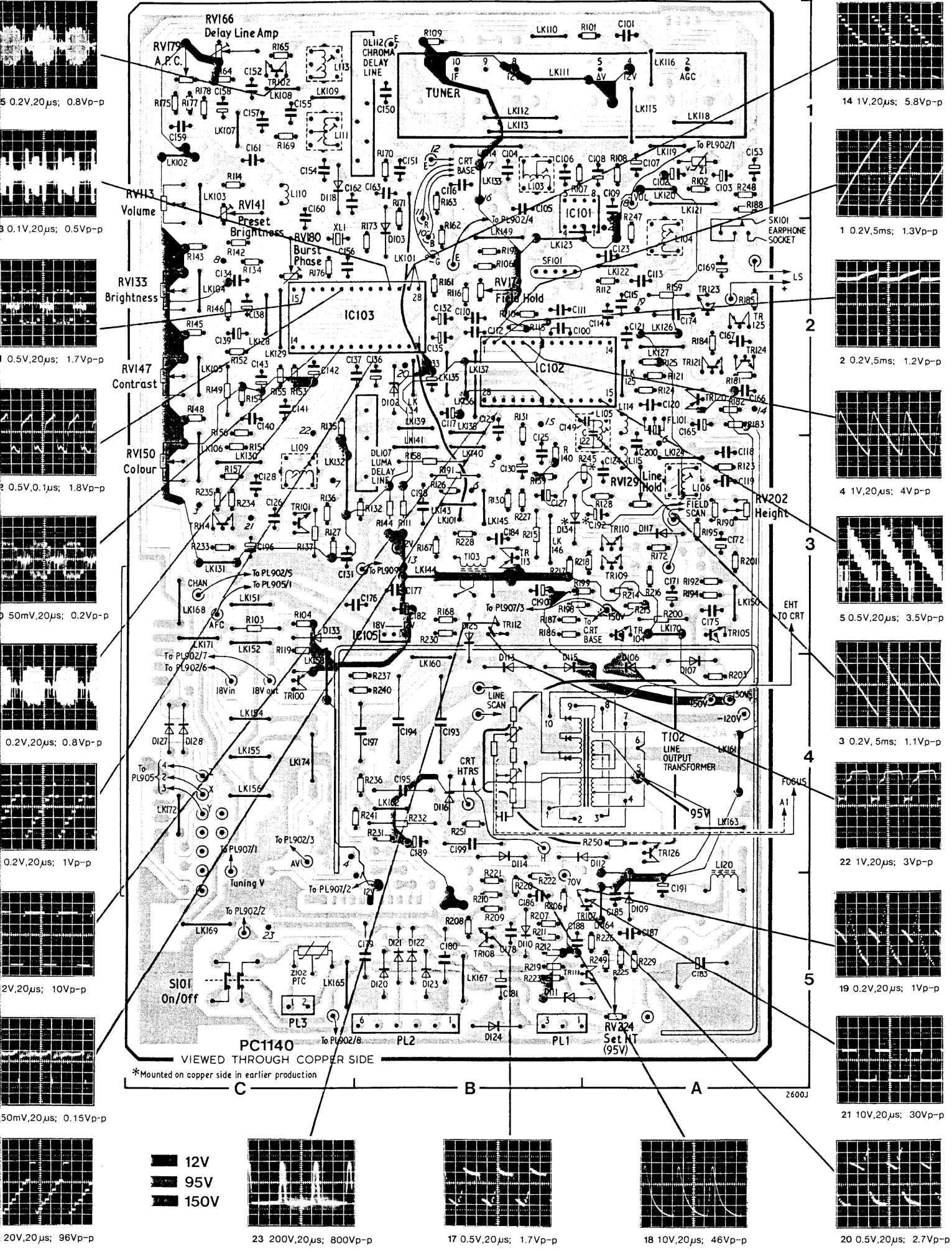
12V
95V
150V



Oscillograms: Voltage and time figures refer to the sensi

Interconnections
Wiring Diagram

MAIN BOARD PC1140
(Component side)



5 0.2V,20µs; 0.8Vp-p

3 0.1V,20µs; 0.5Vp-p

1 0.5V,20µs; 1.7Vp-p

2 0.5V,0.1µs; 1.8Vp-p

0 50mV,20µs; 0.2Vp-p

0.2V,20µs; 0.8Vp-p

0.2V,20µs; 1Vp-p

2V,20µs; 10Vp-p

50mV,20µs; 0.15Vp-p

20V,20µs; 96Vp-p

14 1V,20µs; 5.8Vp-p

1 0.2V,5ms; 1.3Vp-p

2 0.2V,5ms; 1.2Vp-p

4 1V,20µs; 4Vp-p

5 0.5V,20µs; 3.5Vp-p

3 0.2V, 5ms; 1.1Vp-p

22 1V,20µs; 3Vp-p

19 0.2V,20µs; 1Vp-p

21 10V,20µs; 30Vp-p

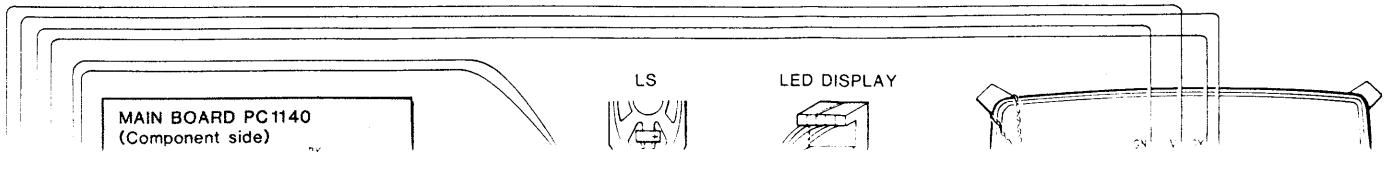
20 0.5V,20µs; 2.7Vp-p

18 10V,20µs; 46Vp-p

17 0.5V,20µs; 1.7Vp-p

23 200V,20µs; 800Vp-p

Oscillograms: Voltage and time figures refer to the sensitivity per division of the graticule.



1. Fit a link between pin 28 of IC102 and earth.

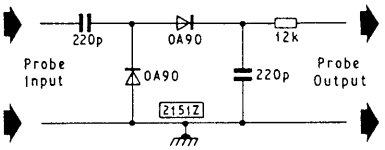
Adjust for optimum overall resolution.

The manufacturers reserve the right to vary specifications or use alternative materials as may be deemed necessary or desirable at any time.

ALIGNMENT

Equipment Required

1. An IF wobbulator with markers.
2. An oscilloscope capable of displaying 100mV at 6MHz.
3. Non-metallic trimming tools.
4. A multirange meter (20kΩ/V) such as the Avometer Model 8.
5. A detector probe such as the one shown.



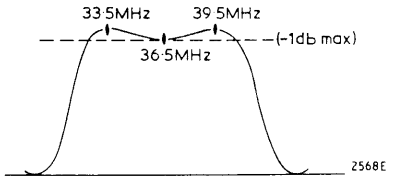
Tuner IF Out and L103

Wobbulator Method

1. Connect the IF wobbulator output lead between pin 9 of the tuner and earth. Connect the input of the detector probe to pin 3 of IC101 and the probe output to the oscilloscope. Link pins 20 and 21 of IC102.

2. Set the wobbulator centre-frequency to 36.5MHz and the output to maximum, and switch on the receiver. Adjust the wobbulator 'Y' gain to give a full scale display. Switch on markers at 39.5MHz and 33.5MHz. Adjust the tuner IF output coil and the input coil L103 (bandpass) for a symmetrical response centred on 36.5MHz as shown in the diagram.

The markers should be no more than 1dB down the slope. No further adjustments are necessary.



Alternative Method (Spot Frequency)

1. Connect the output of the signal generator between pin 9 of tuner and earth. Connect the input of the detector probe to pin 3 of IC101 and the probe output into the oscilloscope 'Y' amplifier, set to d.c. Link pins 20 and 21 of IC102.

2. Set the signal generator to 36.3MHz. Turn up the generator output and adjust the scope 'Y' amplifier gain for a satisfactory indication (shift of trace). Remove L103 input coil core. Adjust the tuner IF coil for maximum output at 36.3MHz. Insert L103 input coil core. Set the signal generator to 33MHz. Tune L103 for maximum output.

(Note: L103 has 2 peaks, the correct one leaves the core below former and can top.)

Switch off the receiver and disconnect the probe and link.

Carrier/AFC Coil, L105

1. Unplug Aerial.
2. Enable AFC.
3. Inject 39.5MHz carrier into tuner test point pin 9 (loosely couple generator to tuner).
4. Connect the meter (10V d.c. range) to pin 17 of IC102.
5. Adjust L105 for 6V reading.

Sound Peak Detector Coil, L104

1. Mute the sound by removing the aerial.
2. Note voltage on pin 12 of IC102 (meter set to 10V d.c. range).
3. Refit aerial ensuring that the receiver is tuned to a programme and set the Volume control to maximum.
4. Set the d.c. voltage on pin 12 of IC102 for the same voltage as before by adjusting L104.

Chroma Take-off (L106, L109)

Wobbulator Method

1. Connect the output from the wobbulator to pin 16 IC102.
2. Connect wobbulator input to pin 11 IC103.
3. Set wobbulator centre frequency to 5MHz with a sweep of ±3MHz.
4. Adjust L106 for minimum 6MHz and L109 for maximum 4.43MHz as shown

Spot Frequency Method

1. Connect the oscilloscope across R151.
2. Inject 6MHz to junction of C200/FL1.
3. Adjust L106 for minimum display.
4. Remove signal generator and tune to an off-air colour transmission.
5. Adjust L109 for maximum burst amplitude on display.

Chrominance Adjustments

The following setting up instructions are carried out using a Colour Bar Generator incorporating colourless area information.

Where applicable, alternative procedures are given using an off-air colour bar signal or generator without colourless area information.

1. Decouple pin 16 of IC103 to chassis to remove burst (0.1μF capacitor can be used.)
2. Disable colour killer by linking across R156.
3. Reduce signal strength until picture is 'noisy'. Adjust RV179 to obtain locked colour on the screen.
4. Remove decoupling from pin 16 and link from R156.
5. Connect oscilloscope at red video output (junction TR903/R914) and inject a colour bar signal.
6. Turn Colour control (RV150) to maximum. Whilst observing the colour bar 'staircase' waveform on the oscilloscope adjust each of the following in turn to give minimum amplitude (wobble) on the display:

RV166 (DL amp), L113 (DL input coil), L111 (DL phase).

Alternatively, connect an 0.1μF between pins 9 and 20 of IC103. Disconnect one end of D103 (burst gating). With the oscilloscope connected to pin 24 of IC103 adjust L113, L111, RV166 for minimum 4.43MHz on display. Remove the 0.1μF from pins 9 and 20 and re-connect D103.

7. Adjust RV180 (Phase) to eliminate colour from colourless areas on receiver screen.

Alternatively, link pins 24 and 25 of IC103 together and adjust RV180 to give minimum venetian blind effect in the red area. Remove the link.

If venetian blind effect is still noticeable then slight readjustment of L113 and L111 (DL input and phase coils) will be required.

FERGUSON TX

THORN EMI

portable colour television

service manual

TX90

FOR SERVICE MANUALS
contact
MAURITRON ELECTRONICS
8 Cherrytree Road, Chinnor
Oxon OX9 4QY.
Tel:- (0844) 51694

The manufacturers reserve the right to vary specifications or use alternative materials as may be deemed necessary or desirable at any time.

4. Adjust L106 for minimum 6MHz and L109 for maximum 4.43MHz as shown

Spot Frequency Method

1. Connect the oscilloscope across R151.
2. Inject 6MHz to junction of C200/FL1.
3. Adjust L106 for minimum display.
4. Remove signal generator and tune to an off-air colour transmission.
5. Adjust L109 for maximum burst amplitude on display.

Chrominance Adjustments

The following setting up instructions are carried out using a Colour Bar Generator incorporating colourless area information.

Where applicable, alternative procedures are given using an off-air colour bar signal or generator without colourless area information.

1. Decouple pin 16 of IC103 to chassis to remove burst (0.1μF capacitor can be used.)
2. Disable colour killer by linking across R156.
3. Reduce signal strength until picture is 'noisy'. Adjust RV179 to obtain locked colour on the screen.
4. Remove decoupling from pin 16 and link from R156.
5. Connect oscilloscope at red video output (junction TR903/R914) and inject a colour bar signal.
6. Turn Colour control (RV150) to maximum. Whilst observing the colour bar 'staircase' waveform on the oscilloscope adjust each of the following in turn to give minimum amplitude (wobble) on the display:

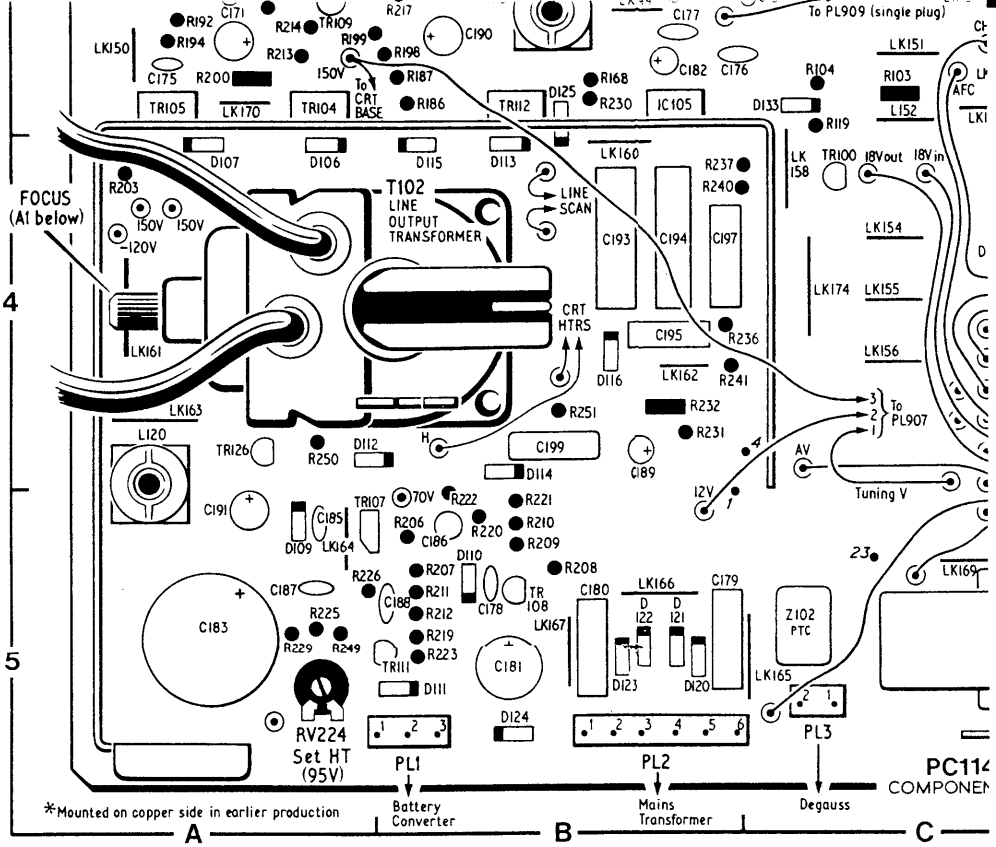
RV166 (DL amp), L113 (DL input coil), L111 (DL phase).

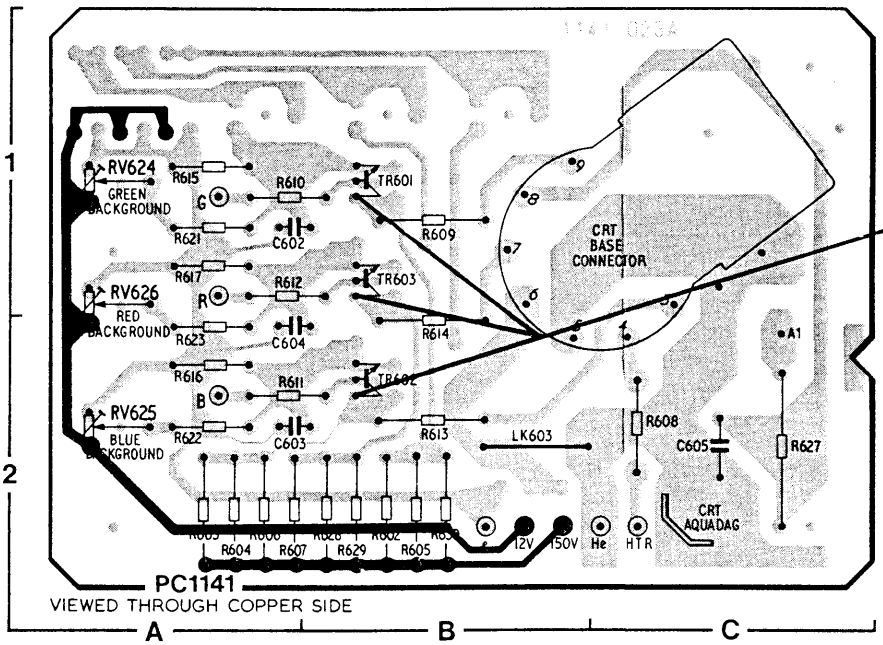
Alternatively, connect an 0.1μF between pins 9 and 20 of IC103. Disconnect one end of D103 (burst gating). With the oscilloscope connected to pin 24 of IC103 adjust L113, L111, RV166 for minimum 4.43MHz on display. Remove the 0.1μF from pins 9 and 20 and re-connect D103.

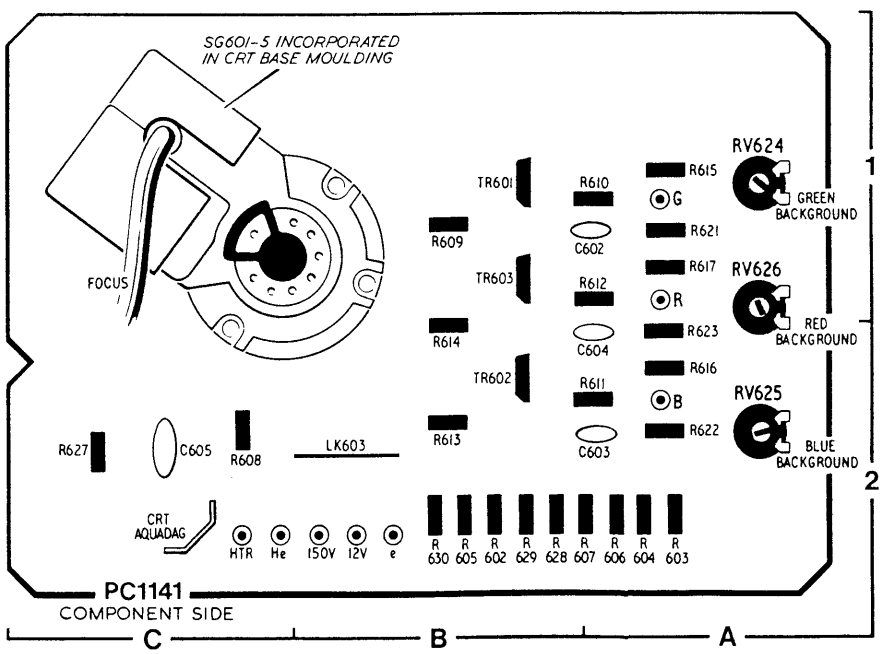
7. Adjust RV180 (Phase) to eliminate colour from colourless areas on receiver screen.

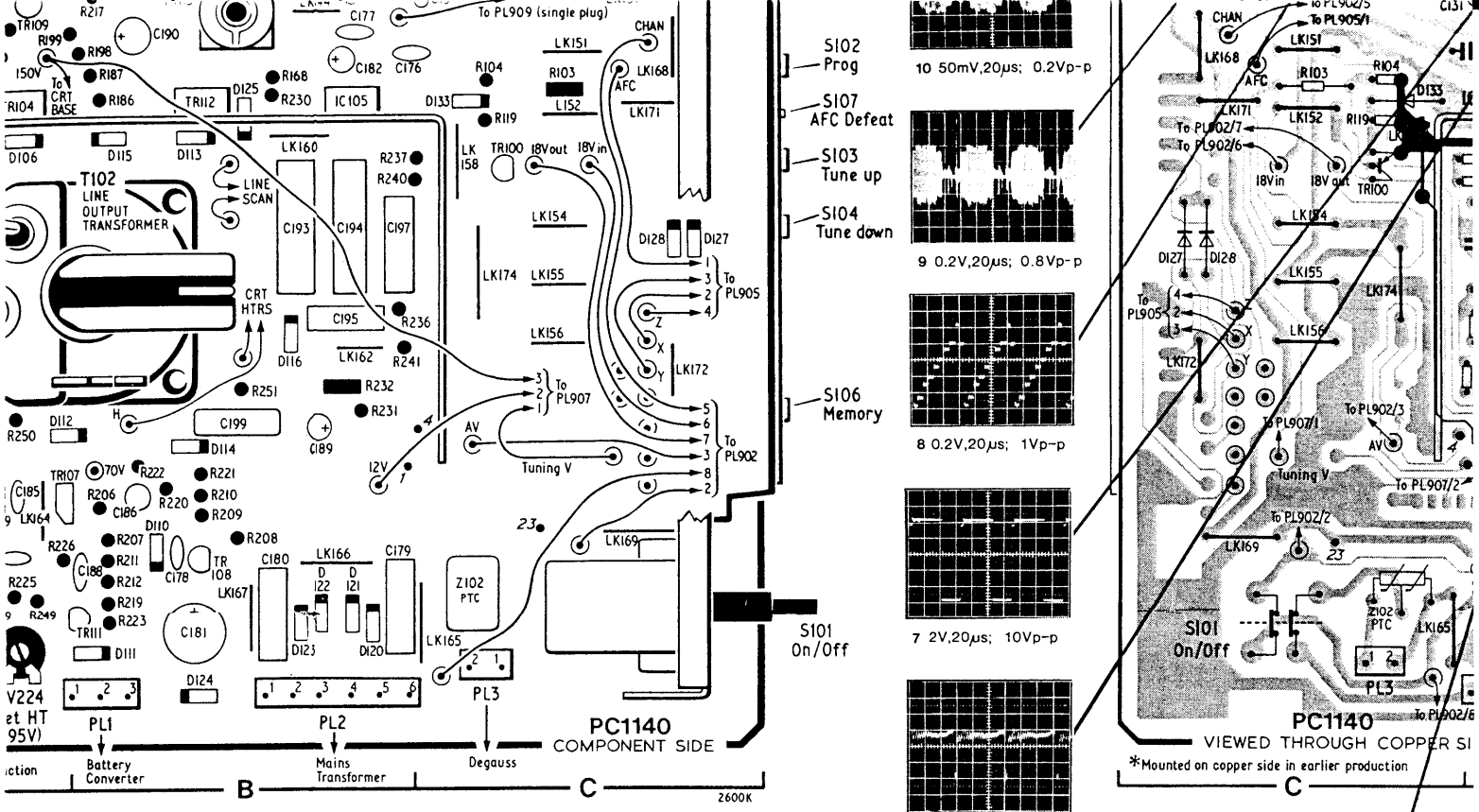
Alternatively, link pins 24 and 25 of IC103 together and adjust RV180 to give minimum venetian blind effect in the red area. Remove the link.

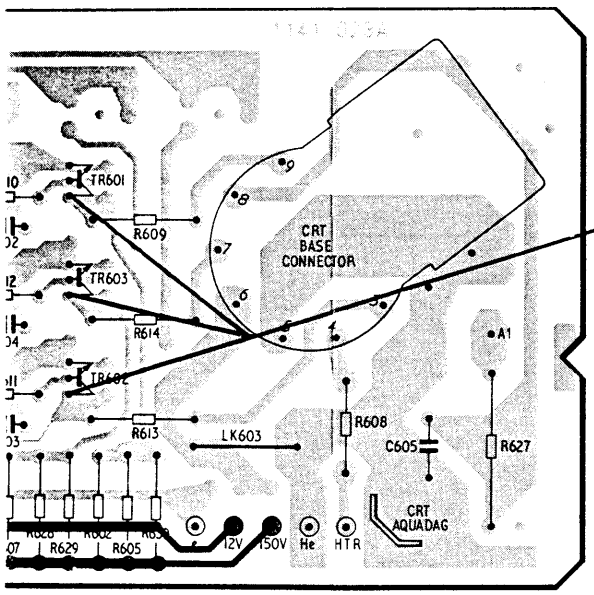
If venetian blind effect is still noticeable then slight readjustment of L113 and L111 (DL input and phase coils) will be required.







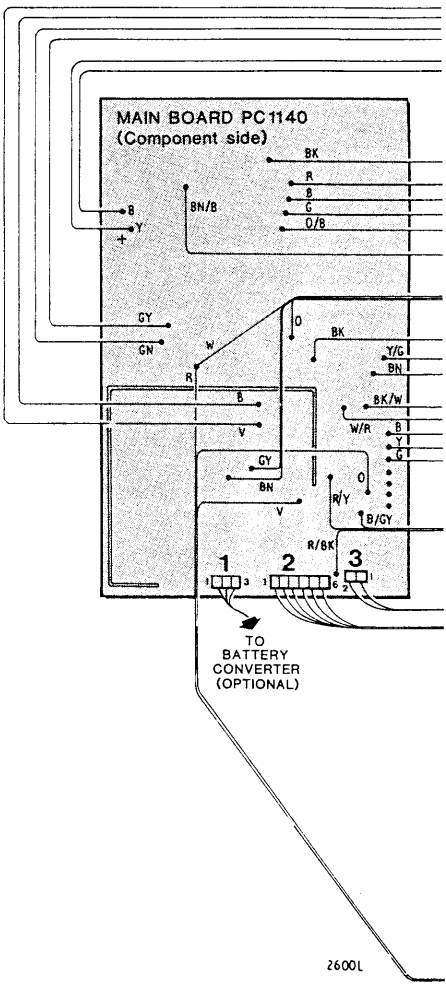


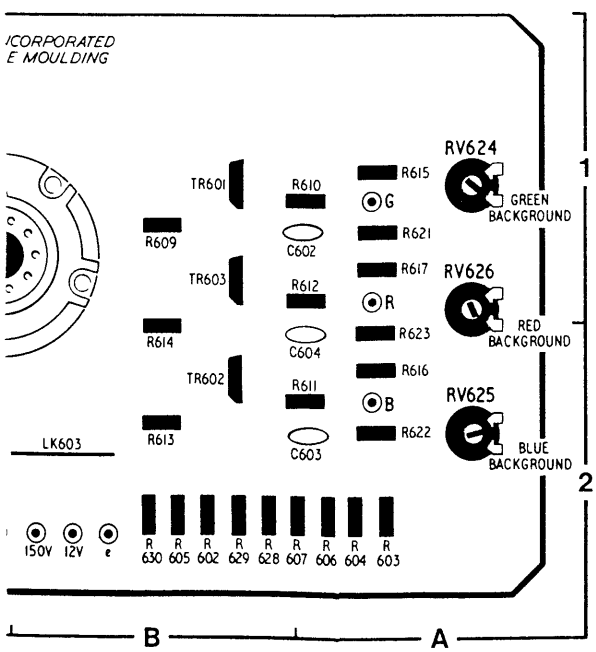


Oscillograms: Voltage and time figures refer to the sensitiv

Interconnections Wiring Diagram

Note: In some models the tube earthing arrangement differs from that shown here.



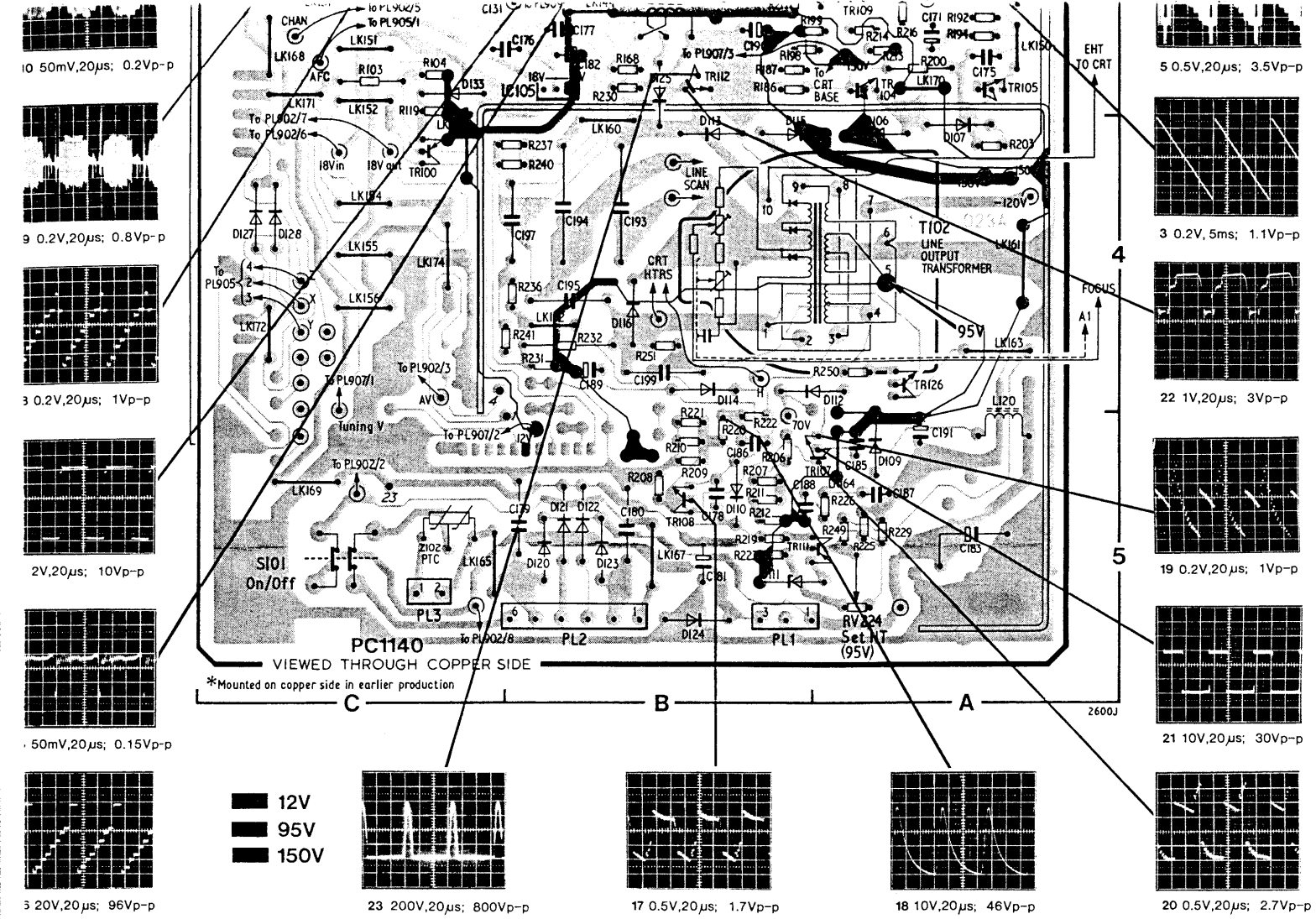


USE ONLY THORN EMI APPROVED REPLACEMENT PARTS

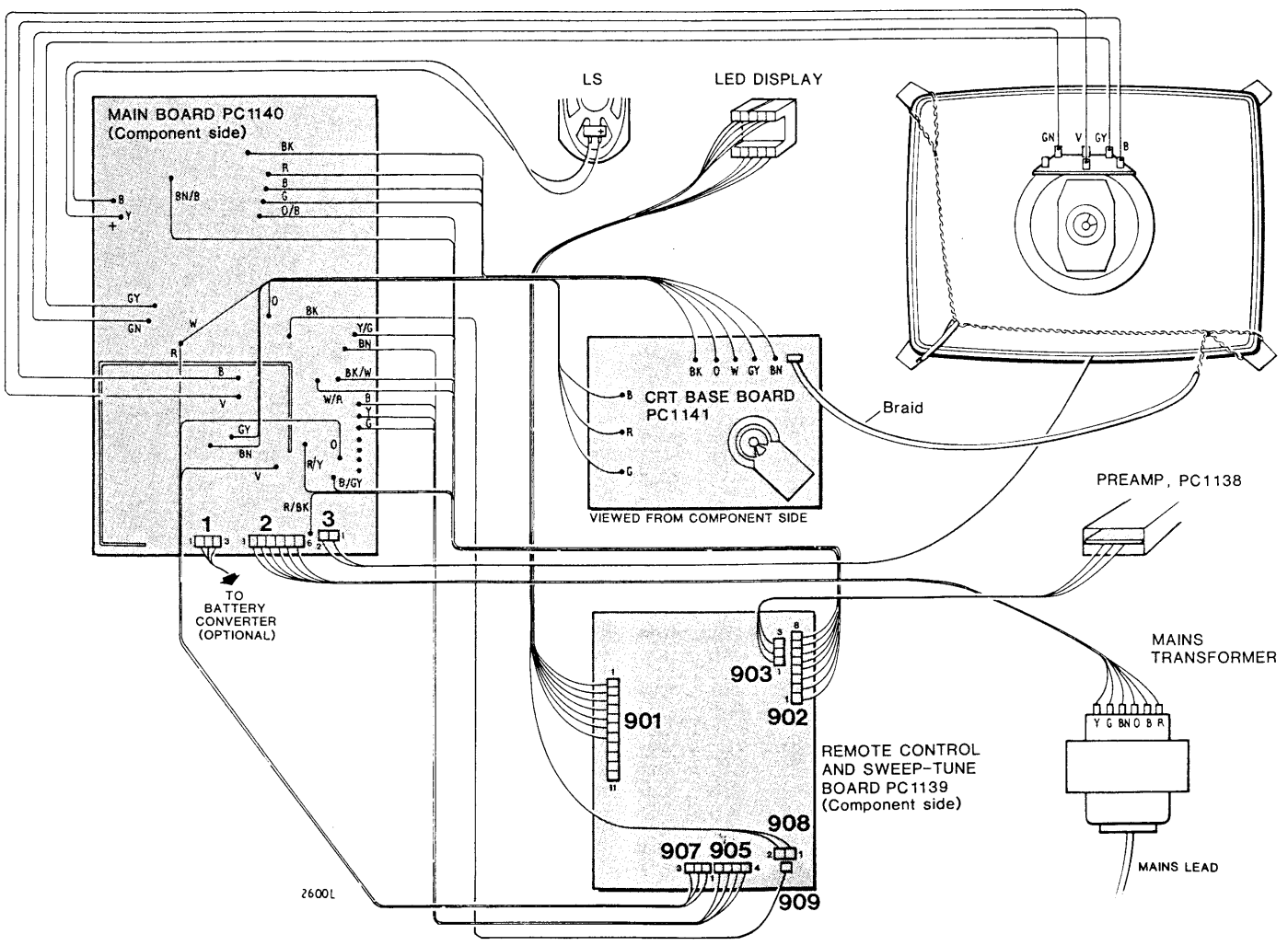
⚠ indicates critical safety components, and identical components should be used for replacement.

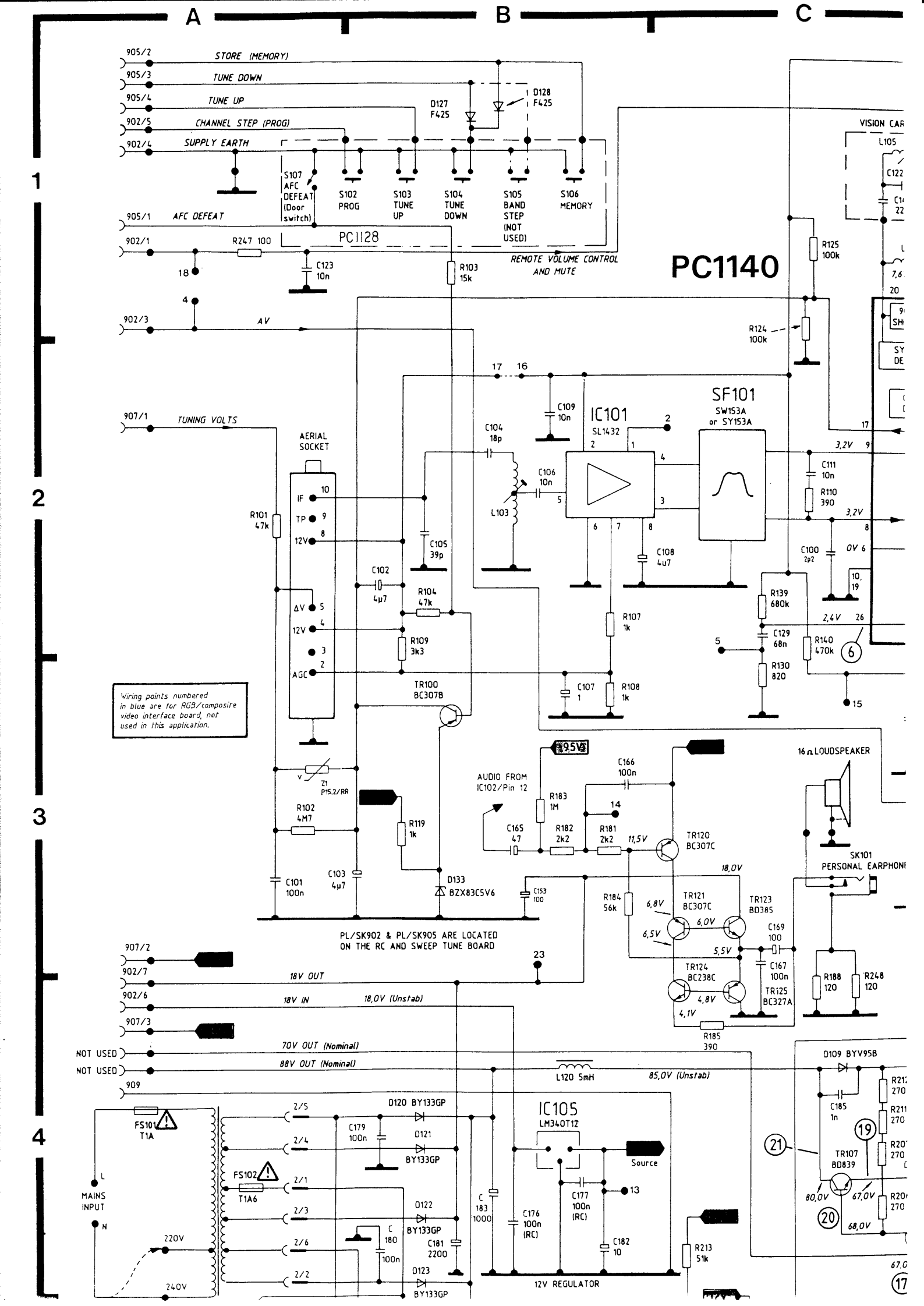
All other components have been selected after prolonged laboratory tests and in the interests of safety it is recommended that only THORN EMI Replacement Parts are used to ensure that any repairs do not reduce the high standards of original manufacture.

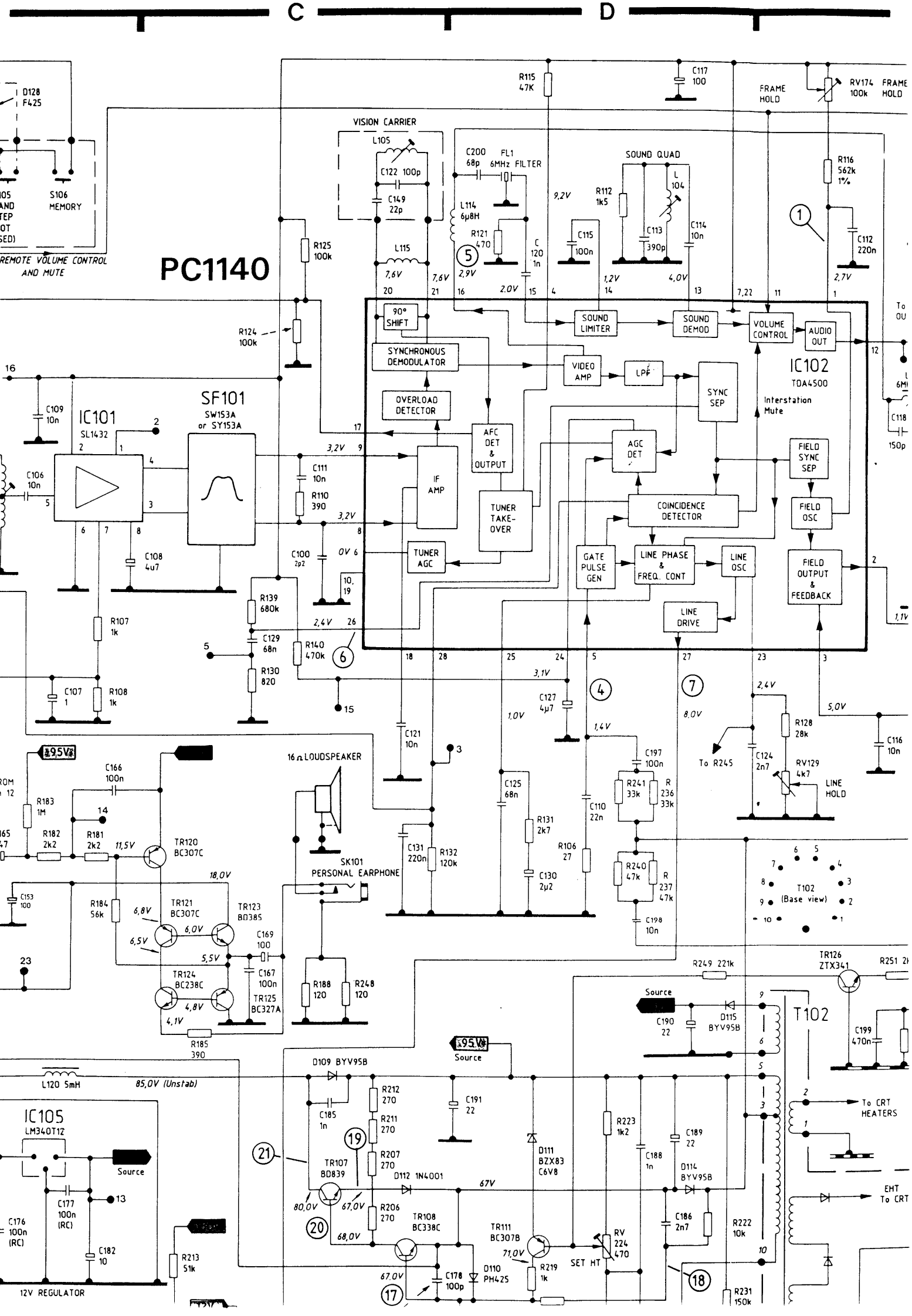
The Company will not accept responsibility if any replacement parts from a source other than THORN EMI FERGUSON Limited Service Division are used.

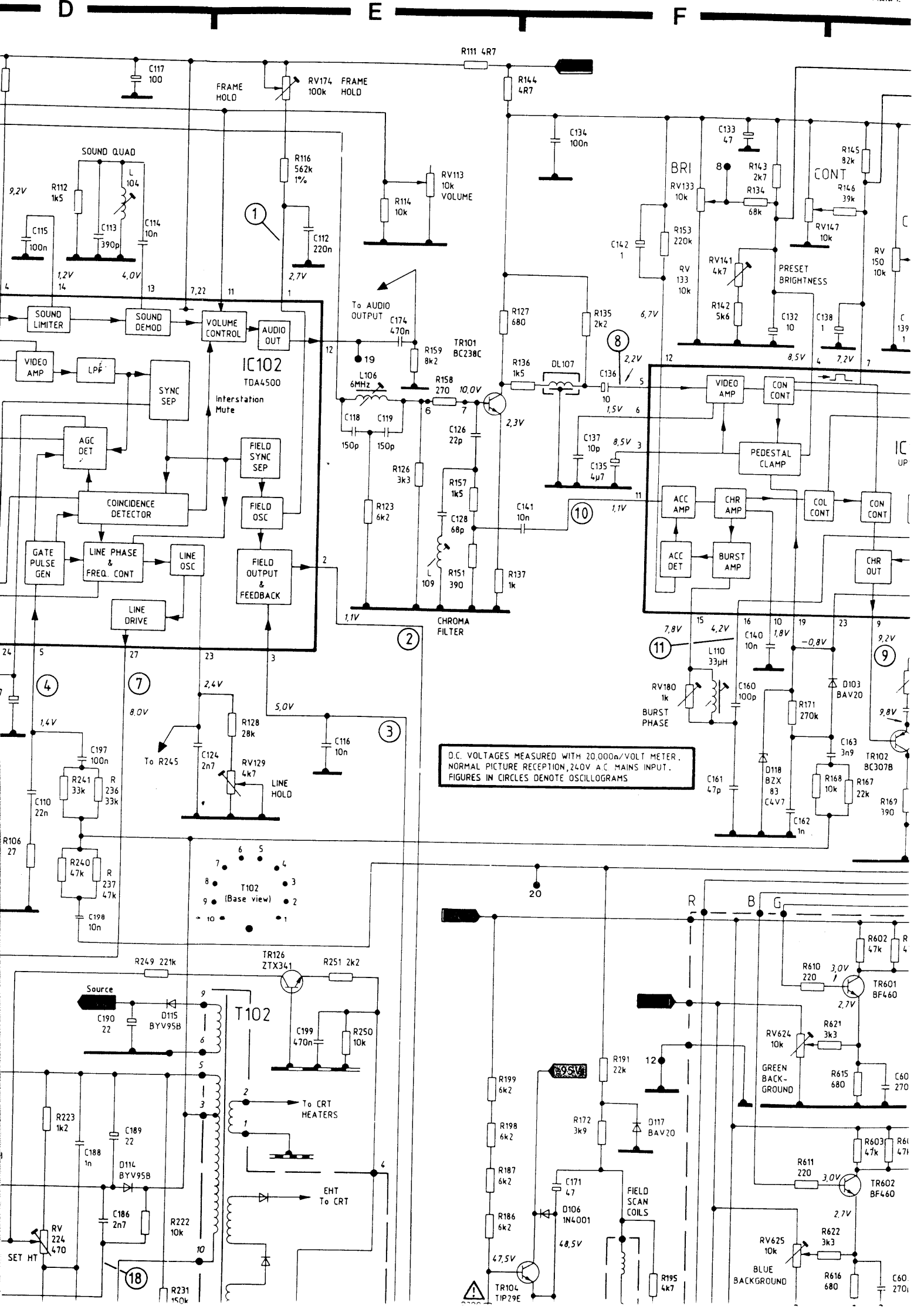


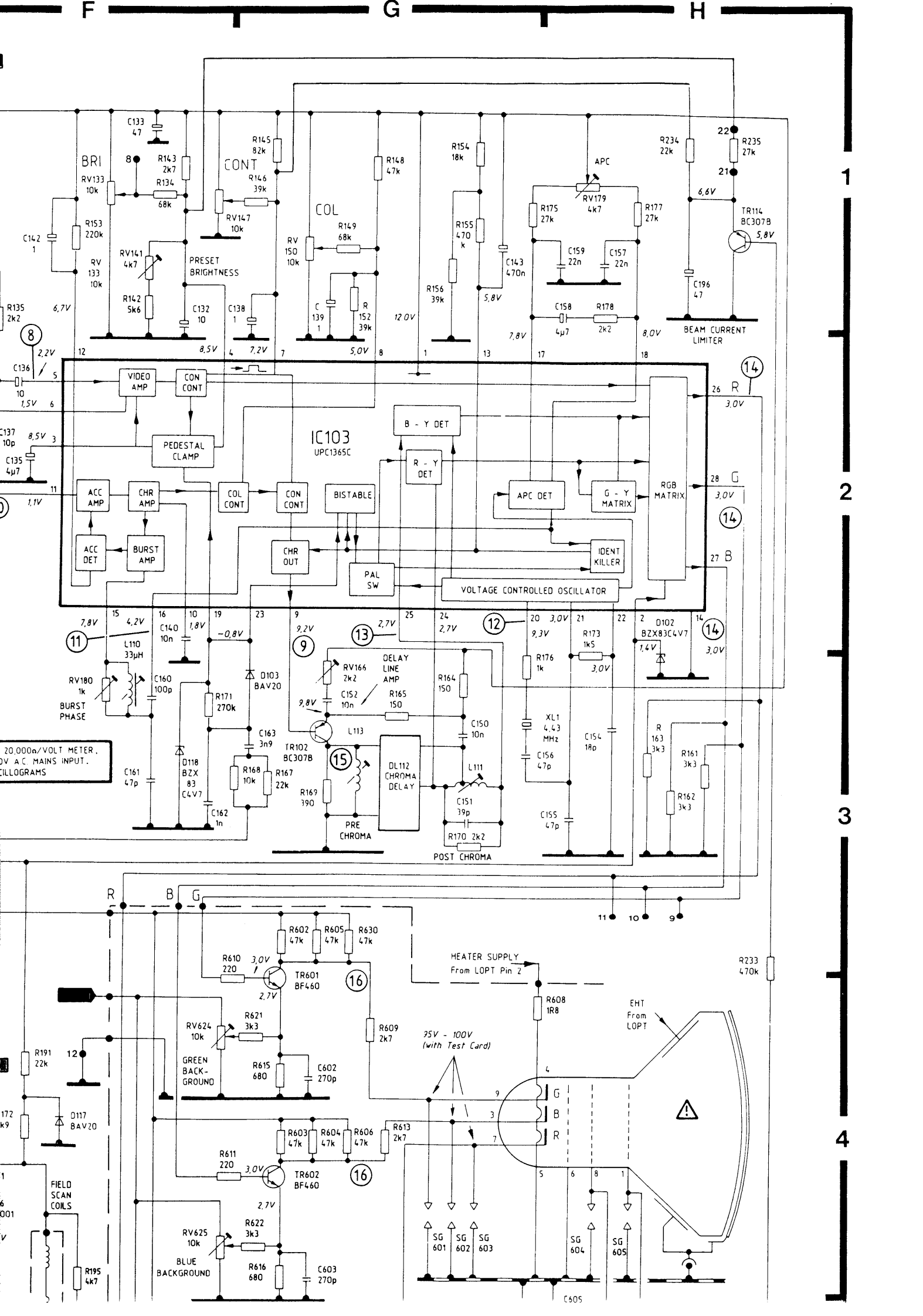
Oscillograms: Voltage and time figures refer to the sensitivity per division of the graticule.

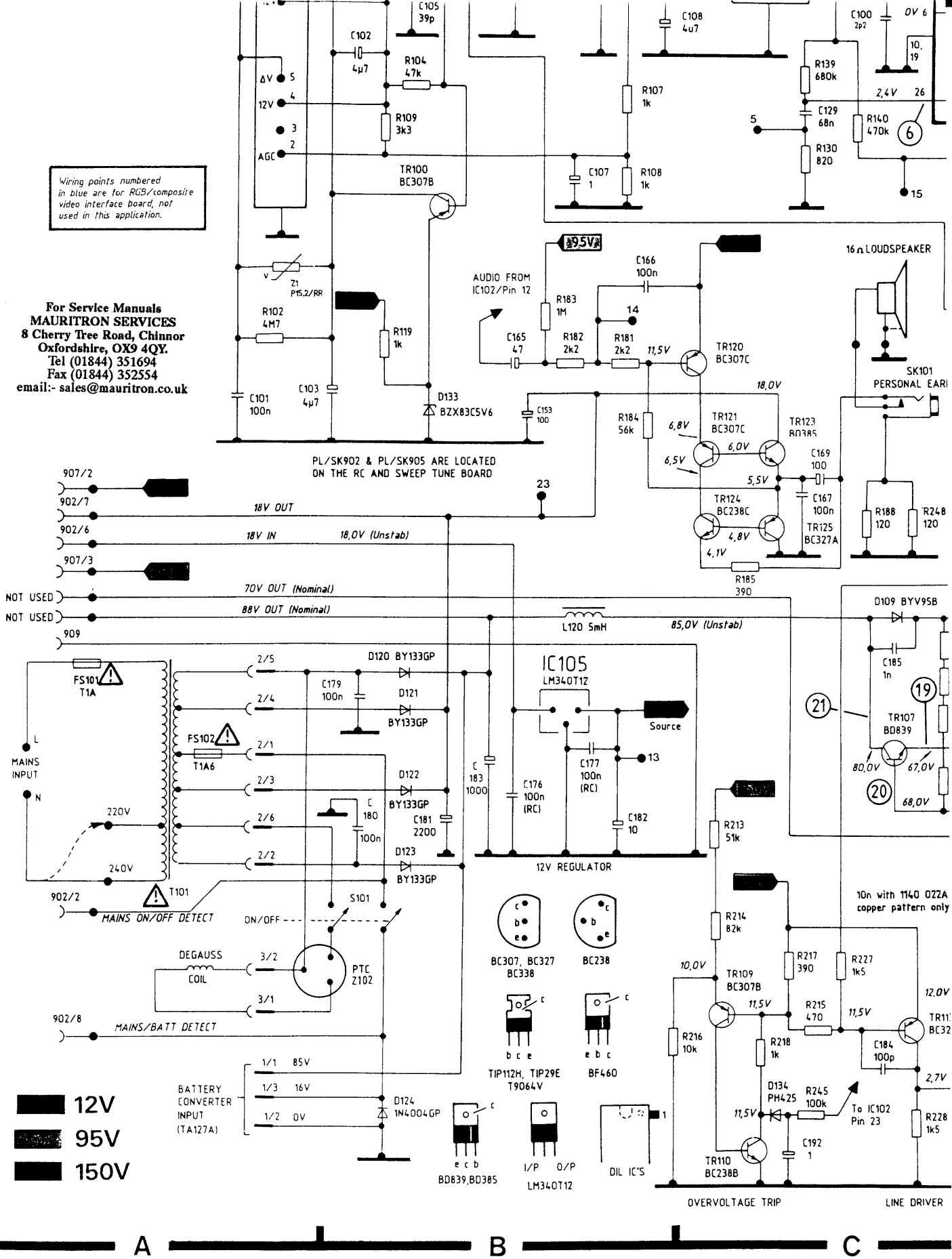



A
B
C
1
2
3
4
905/2
STORE (MEMORY)
905/3
TUNE DOWN
905/4
TUNE UP
902/5
CHANNEL STEP (PROG)
902/4
SUPPLY EARTH
D127 F425
D128 F425
S107 AFC DEFEAT (Door switch)
S102 PROG
S103 TUNE UP
S104 TUNE DOWN
S105 BAND STEP (NOT USED)
S106 MEMORY
905/1
AFC DEFEAT
902/1
R247 100
PC1128
18
C123 10n
R103 15k
REMOTE VOLUME CONTROL AND MUTE
PC1140
4
902/3
AV
R125 100k
R124 100k
17
16
C109 10n
IC101
SL1432
SF101
SW153A or SY153A
907/1
TUNING VOLTS
AERIAL SOCKET
C104 18p
C106 10n
L103
C105 39p
C108 4u7
3,2V
C111 10n
R110 390
R101 47k
IF
TP
12V
ΔV
AGC
C102 4µ7
R104 47k
R109 3k3
R107 1k
C107 1
R108 1k
C100 2p2
0V
R139 680k
2,4V
C129 68n
R140 470k
R130 820
TR100 BC307B
Wiring points numbered in blue are for RGB/composite video interface board, not used in this application.
Z1 P15.2/RR
R102 4M7
R119 1k
C101 100n
C103 4µ7
D133 BZX83C5V6
C153 100
AUDIO FROM IC102/Pin 12
C165 47
R183 1M
R182 2k2
R181 2k2
11,5V
C166 100n
TR120 BC307C
9,5V
16Ω LOUDSPEAKER
SK101 PERSONAL EARPHONE
18,0V
R184 56k
6,8V
TR121 BC307C
TR123 BD385
6,0V
6,5V
5,5V
C169 100
C167 100n
TR124 BC238C
TR125 BC327A
4,8V
4,1V
R188 120
R248 120
R185 390
PL/SK902 & PL/SK905 ARE LOCATED ON THE RC AND SWEEP TUNE BOARD
907/2
902/7
18V OUT
902/6
18V IN
18,0V (Unstab)
907/3
NOT USED
NOT USED
70V OUT (Nominal)
88V OUT (Nominal)
909
L120 5mH
85,0V (Unstab)
D109 BYV95B
FS101 T1A
FS102 T1A6
MAINS INPUT
220V
240V
D120 BY133GP
D121 BY133GP
D122 BY133GP
D123 BY133GP
C179 100n
C180 100n
C181 2200
C183 1000
IC105 LM340T12
C176 100n (RC)
C177 100n (RC)
C182 10
Source
12V REGULATOR
R213 51k
TR107 BD839
80,0V
67,0V
68,0V
C185 1n
R211 270
R212 270
R207 270
R208 270
VISION CAR
L105
C122
SHI
SY
DE


C
D
PC1140
REMOTE VOLUME CONTROL AND MUTE
S106 MEMORY
VISION CARRIER
L105
C122 100p
C149 22p
L115
R125 100k
R124 100k
C200 68p
FL1 6MHz FILTER
L114 6µ8H
R121 470
C 120 1n
R115 47K
C117 100
FRAME HOLD
RV174 100k FRAME HOLD
SOUND QUAD
R112 1k5
L 104
C113 390p
C114 10n
C115 100n
R116 562k 1%
C112 220n
2,7V
90° SHIFT
SOUND LIMITER
SOUND DEMOD
VOLUME CONTROL
AUDIO OUT
SYNCHRONOUS DEMODULATOR
VIDEO AMP
LPF
SYNC SEP
IC102
TDA4500
Interstation Mute
OVERLOAD DETECTOR
AFC DET & OUTPUT
AGC DET
FIELD SYNC SEP
IF AMP
TUNER TAKE-OVER
COINCIDENCE DETECTOR
FIELD OSC
TUNER AGC
GATE PULSE GEN
LINE PHASE & FREQ. CONT
LINE OSC
FIELD OUTPUT & FEEDBACK
LINE DRIVE
IC101
SL1432
SF101
SW153A or SY153A
C109 10n
C106 10n
C108 4u7
C111 10n
R110 390
C100 2p2
R139 680k
C129 68n
R130 820
R140 470k
R107 1k
C107 1
R108 1k
C121 10n
C127 4µ7
C197 100n
R241 33k
R 236 33k
C110 22n
C125 68n
R131 2k7
C130 2µ2
R106 27
C131 220n
R132 120k
R240 47k
R 237 47k
C198 10n
R128 28k
C124 2n7
RV129 4k7
LINE HOLD
To R245
C116 10n
16Ω LOUDSPEAKER
SK101 PERSONAL EARPHONE
T102 (Base view)
C166 100n
R183 1M
R182 2k2
R181 2k2
TR120 BC307C
R184 56k
TR121 BC307C
TR123 BD385
C169 100
C167 100n
TR124 BC238C
TR125 BC327A
R185 390
R188 120
R248 120
C153 100
R249 221k
TR126 ZTX341
R251 2k
Source
C190 22
D115 BYV95B
C199 470n
T102
L120 5mH
85,0V (Unstab)
D109 BYV95B
C185 1n
R212 270
R211 270
R207 270
C191 22
D111 BZX83 C6V8
R223 1k2
C188 1n
C189 22
D114 BYV95B
To CRT HEATERS
EHT To CRT
TR107 BD839
D112 1N4001
67V
R206 270
TR108 BC338C
TR111 BC307B
RV 224 470
SET HT
R219 1k
C178 100p
D110 PH425
C186 2n7
R222 10k
R231 150k
IC105
LM340T12
Source
C177 100n (RC)
C176 100n (RC)
C182 10
R213 51k
12V REGULATOR
6,8V
6,0V
6,5V
5,5V
4,8V
4,1V
11,5V
18,0V
80,0V
67,0V
68,0V
71,0V
67,0V
9,2V
7,6V
2,9V
2,0V
1,2V
4,0V
7,22
3,2V
2,4V
1,0V
1,4V
3,1V
8,0V
5,0V
1,1V
0V
To OU
150p
6M


D
E
F
IC102
TDA4500
SOUND LIMITER
SOUND DEMOD
VOLUME CONTROL
AUDIO OUT
VIDEO AMP
LPF
SYNC SEP
AGC DET
FIELD SYNC SEP
COINCIDENCE DETECTOR
FIELD OSC
GATE PULSE GEN
LINE PHASE & FREQ. CONT
LINE OSC
FIELD OUTPUT & FEEDBACK
LINE DRIVE
Interstation Mute
SOUND QUAD
FRAME HOLD
RV174 100k FRAME HOLD
RV113 10k VOLUME
To AUDIO OUTPUT
TR101 BC238C
CHROMA FILTER
BRI
CONT
PRESET BRIGHTNESS
PEDESTAL CLAMP
ACC AMP
CHR AMP
COL CONT
CON CONT
ACC DET
BURST AMP
CHR OUT
BURST PHASE
To R245
LINE HOLD
T102
(Base view)
TR126 ZTX341
Source
To CRT HEATERS
EHT To CRT
SET HT
FIELD SCAN COILS
TR104 TIP29E
D106 1N4001
TR601 BF460
TR602 BF460
GREEN BACK-GROUND
BLUE BACKGROUND
TR102 BC307B
D.C. VOLTAGES MEASURED WITH 20.000n/VOLT METER.
NORMAL PICTURE RECEPTION, 240V A.C. MAINS INPUT.
FIGURES IN CIRCLES DENOTE OSCILLOGRAMS


F
G
H
1
2
3
4
BRI
CONT
COL
PRESET BRIGHTNESS
APC
BEAM CURRENT LIMITER
IC103
UPC1365C
VIDEO AMP
CON CONT
PEDESTAL CLAMP
B - Y DET
R - Y DET
ACC AMP
CHR AMP
COL CONT
CON CONT
BISTABLE
APC DET
G - Y MATRIX
RGB MATRIX
ACC DET
BURST AMP
CHR OUT
IDENT KILLER
PAL SW
VOLTAGE CONTROLLED OSCILLATOR
DELAY LINE AMP
DL112 CHROMA DELAY
PRE CHROMA
POST CHROMA
BURST PHASE
TR102 BC307B
TR601 BF460
TR602 BF460
HEATER SUPPLY From LOPT Pin 2
EHT From LOPT
35V - 100V (with Test Card)
GREEN BACK-GROUND
BLUE BACKGROUND
FIELD SCAN COILS
SG 601
SG 602
SG 603
SG 604
SG 605
20,000n/VOLT METER.
0V A.C. MAINS INPUT.
CILLOGRAMS

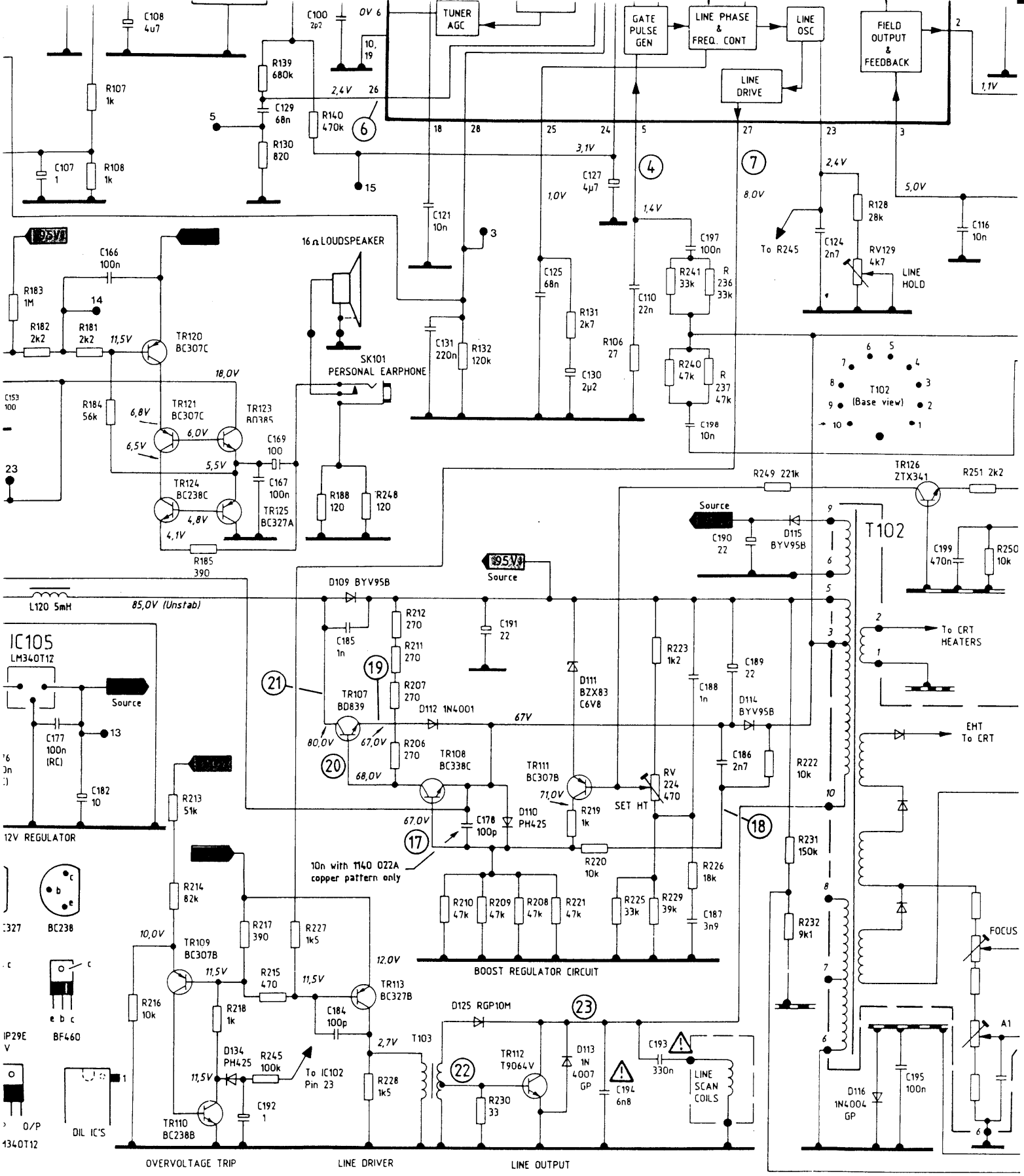


GRID REFERENCES

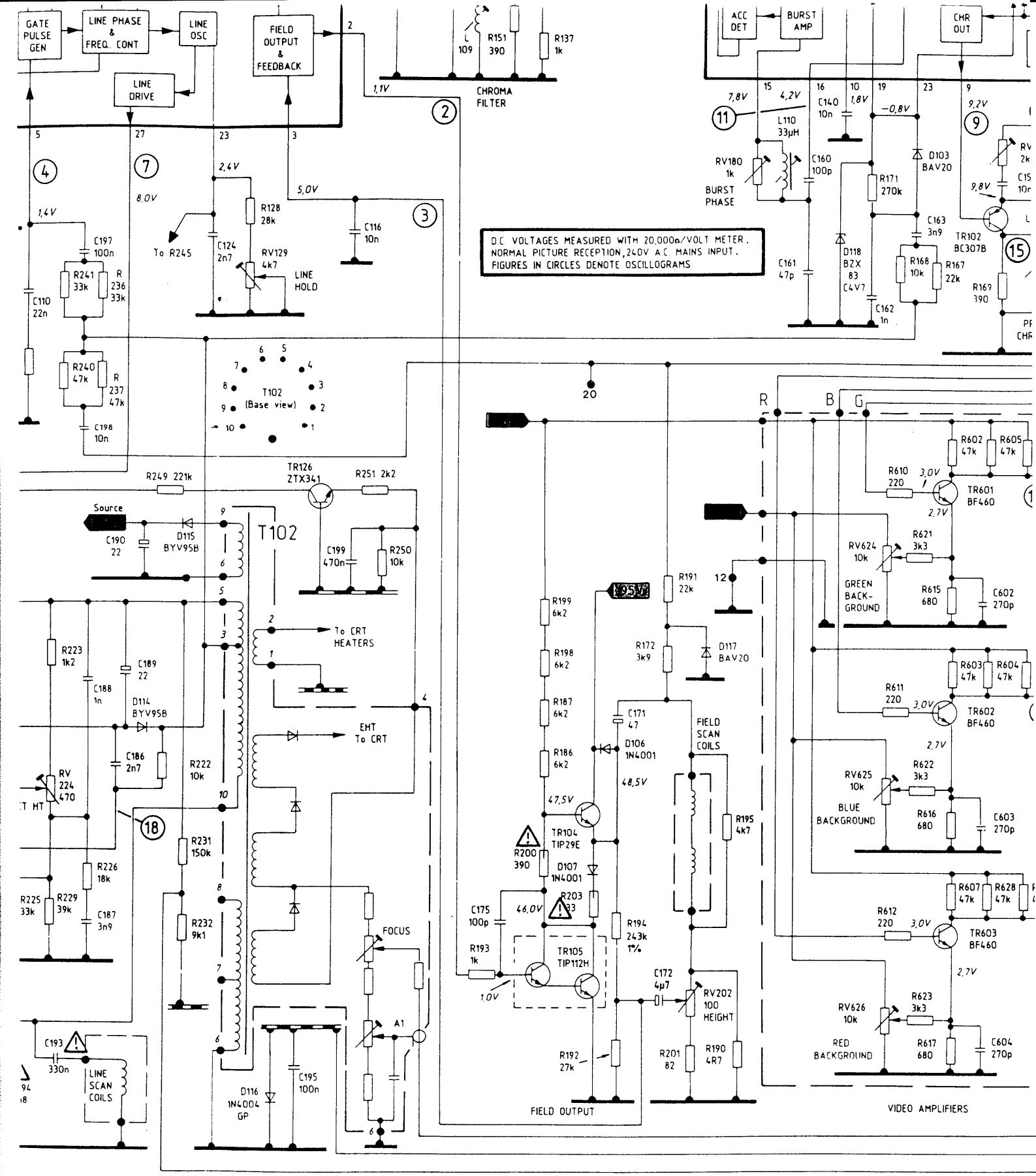
The circuit diagram location is followed by the printed panel location shown overleaf.

PC1140

C100 ... C2,*B2*
C101 ... A3,*A1*
C102 ... B2,*A1*
C103 ... B3,*A1*
C104 ... B2,*B1*
C105 ... B2,*B1*
C106 ... B2,*B1*
C107 ... B3,*A1*
C108 ... B2,*A1*
C109 ... B2,*A1*
C110 ... D3,*B2*
C111 ... C2,*B2*
C112 ... E1,*B2*
C113 ... D1,*A2*
C114 ... D1,*A2*
C115 ... D1,*A2*
C116 ... E3,*B1*
C117 ... D1,*B2*
C118 ... E2,*A3*
C119 ... E2,*A3*
C120 ... D1,*A2*
C121 ... C3,*A2*
C122 ... C1,*B2*
C123 ... A1,*A2*
C124 ... D3,*A3*
C125 ... D3,*B3*
C126 ... E2,*C3*
C127 ... D3,*B3*
C128 ... E2,*C3*
C129 ... C2,*B2*
C130 ... D3,*B3*
C131 ... C3,*C3*
C132 ... F1,*B2*
C133 ... F1,*B2*
C134 ... F1,*C2*
C135 ... F2,*B2*
C136 ... F2,*B2*
C137 ... F2,*C2*
C138 ... G1,*C2*
C139 ... G1,*C2*
C140 ... F2,*C2*
C141 ... F2,*C2*
C142 ... F1,*C2*
C143 ... G1,*C2*
C149 ... C1,*A2*
C150 ... G3,*B1*
C151 ... G3,*B1*
C152 ... G3,*C1*
C153 ... B3,*A1*
C154 ... H3,*C1*
C155 ... H3,*C1*
C156 ... G3,*C2*
C157 ... H1,*C1*
C158 ... H1,*C1*
C159 ... H1,*C1*
C160 ... F3,*C1*
C161 ... F3,*C1*
C162 ... F3,*C1*
C163 ... G3,*B1*
C165 ... B3,*A2*
C166 ... B3,*A2*
C167 ... C3,*A2*
C169 ... C4,*A2*
C171 ... F4,*A3*
C172 ... F5,*A3*
C174 ... E1,*A2*
C175 ... E5,*A3*
C176 ... B4,*C3*
C177 ... B4,*B3*
C178 ... C4,*B5*
C179 ... B4,*B5*
C180 ... B4,*B5*
C181 ... B4,*B5*
C182 ... B4,*B3*
C183 ... B4,*A5*
C184 ... C5,*B3*
C185 ... C4,*A5*
C186 ... D4,*B5*
C187 ... D5,*A5*
C188 ... D4,*B5*
C189 ... D4,*B4*
C190 ... D4,*B3*
C191 ... D4,*A5*
C192 ... C5,*A3*
C193 ... D5,*B4*
C194 ... D5,*B4*
C195 ... E5,*B4*
C196 ... H1,*C3*
C197 ... D3,*B4*
C198 ... D3,*B3*
C199 ... E4,*B4*
C200 ... D1,*A3*
D102 ... H2,*B2*
D103 ... G3,*B2*
D106 ... F4,*A4*
D107 ... F5,*A4*
D109 ... C4,*A5*
D110 ... D4,*B5*
D111 ... D4,*B5*
D112 ... C4,*B4*
D113 ... D5,*B4*
D114 ... D4,*B4*
D115 ... D4,*B4*
D116 ... E5,*B4*
D117 ... F4,*A3*
D118 ... F3,*C1*
D120 ... B4,*B5*
D121 ... B4,*B5*
D122 ... B4,*B5*
D123 ... B4,*B5*
D124 ... B5,*B5*
D125 ... D5,*B3*
D127 ... B1,*C4*
D128 ...
D133 ...
D134 ...
DL107 ...
DL112 ...
FL1 ...
FS101 ...
FS102 ...
IC101 ...
IC102 ...

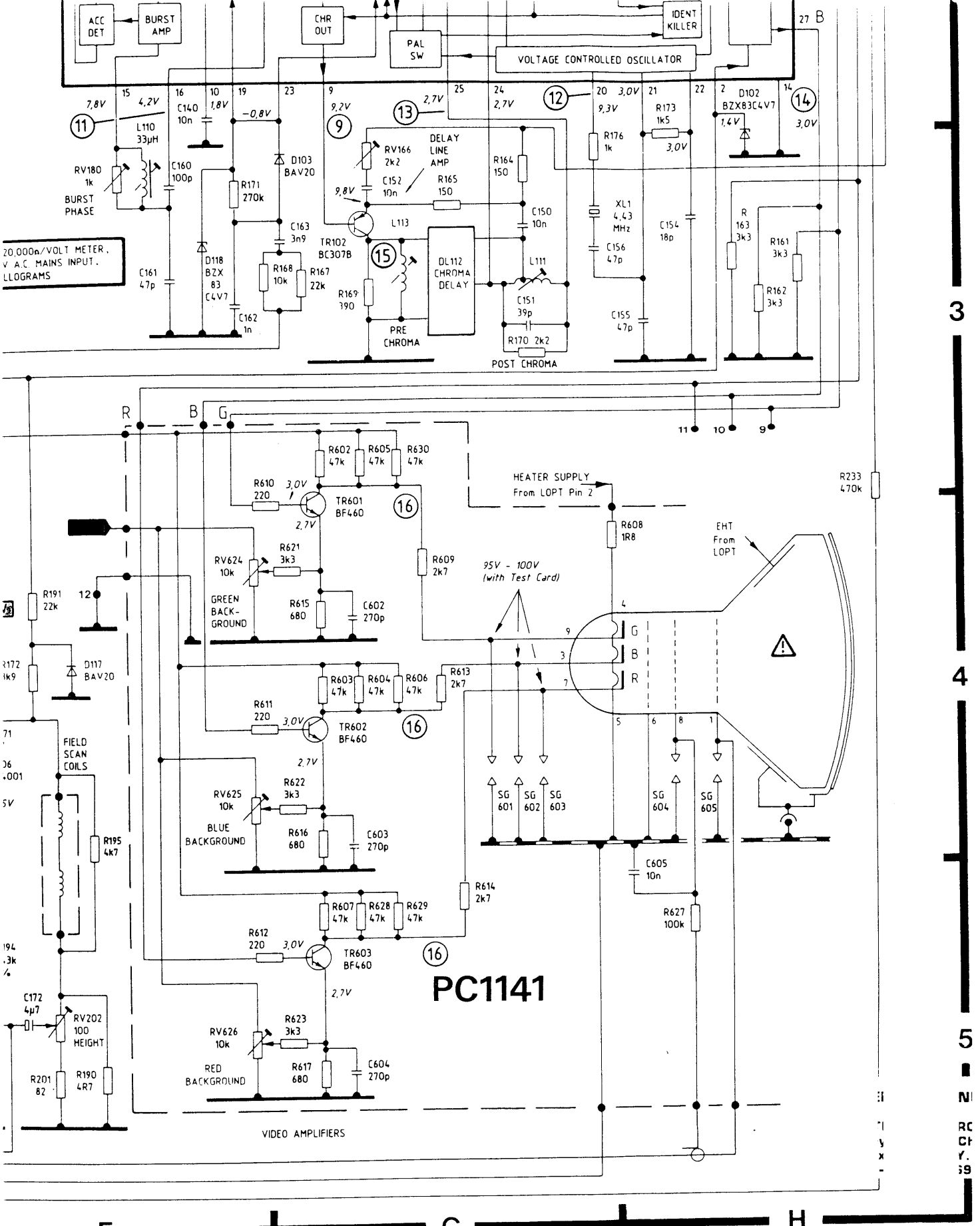


C																			
,B1	C181 ... B4,B5	C195 ... E5,B4	D112 ... C4,B4	D128 ... B1,C4	IC103 ... G2,C2	PL1 ... A5,B5	R112 ... D1,A2	R132 ... C3,B3	R151 ... E2,C3	R167
,A2	C182 ... B4,B3	C196 ... H1,C3	D113 ... D5,B4	D133 ... B3,C3	IC105 ... B4,B3	PL2 ... A4,B5	R114 ... E1,C1	R134 ... F1,C2	R152 ... G1,C2	R168
,A2	C183 ... B4,A5	C197 ... D3,B4	D114 ... D4,B4	D134 ... C5,B3		PL3 ... A5,C5	R115 ... D1,B2	R135 ... F1,C2	R153 ... F1,C2	R169
,A2	C184 ... C5,B3	C198 ... D3,B3	D115 ... D4,B4		L103 ... B2,B1		R116 ... E1,B2	R136 ... F2,C3	R154 ... G1,C2	R170
,A2	C185 ... C4,A5	C199 ... E4,B4	D116 ... E5,B4	DL107 ... F2,B3	L104 ... D1,A2	R101 ... A2,A1	R119 ... B3,C3	R137 ... E2,C3	R155 ... G1,C2	R171
,A3	C186 ... D4,B5	C200 ... D1,A3	D117 ... F4,A3	DL112 ... G3,B1	L105 ... C1,B2	R102 ... A3,A1	R121 ... D1,A2	R139 ... C2,B3	R156 ... G1,C2	R172
,A3	C187 ... D5,A5		D118 ... F3,C1		L106 ... E2,A3	R103 ... B1,C3	R123 ... E2,A3	R140 ... C2,B3	R157 ... E2,C3	R173
,A2	C188 ... D4,B5	D102 ... H2,B2	D120 ... B4,B5	FL1 ... D1,A2	L109 ... E2,C3	R104 ... B2,C3	R124 ... C1,A2	R142 ... F1,C2	R158 ... E2,B3	R175
,A3	C189 ... D4,B4	D103 ... G3,B2	D121 ... B4,B5		L110 ... F3,C1	R106 ... D3,B2	R125 ... C1,A2	R143 ... F1,C2	R159 ... E2,A2	R176
,C3	C190 ... D4,B3	D106 ... F4,A4	D122 ... B4,B5	FS101 ... A4,—	L111 ... G3,C1	R107 ... B2,B1	R126 ... E2,B3	R144 ... E1,B3	R161 ... H3,B2	R177
,B3	C191 ... D4,A5	D107 ... F5,A4	D123 ... B4,B5	FS102 ... A4,—	L113 ... G3,C1	R108 ... B3,A1	R127 ... E1,C3	R145 ... G1,C2	R162 ... H3,B2	R178
,B5	C192 ... C5,A3	D109 ... C4,A5	D124 ... B5,B5		L114 ... D1,A2	R109 ... B2,B1	R128 ... E3,A3	R146 ... G1,C2	R163 ... H3,B1	R181
,B5	C193 ... D5,B4	D110 ... D4,B5	D125 ... D5,B3	IC101 ... B2,B1	L115 ... C1,A3	R110 ... C2,B2	R130 ... C3,B3	R148 ... G1,C2	R164 ... G3,C1	R182
,B5	C194 ... D5,B4	D111 ... D4,B5	D127 ... B1,C4	IC102 ... D2,B2	L120 ... B4,A5	R111 ... E1,B3	R131 ... D3,B3	R149 ... G1,C2	R165 ... G3,C1	R183



D E F

A5,*B5*	R112 ... D1,*A2*	R132 ... C3,*B3*	R151 ... E2,*C3*	R167 ... G3,*B3*	R184 ... B3,*A2*	R201 ... F5,*A3*	R218 ... C5,*A3*	R233 ... H3,*C3*	RV113... E1,*C1*	SF
A4,*B5*	R114 ... E1,*C1*	R134 ... F1,*C2*	R152 ... G1,*C2*	R168 ... G3,*B3*	R185 ... C4,*A2*	R203 ... F5,*A4*	R219 ... D4,*B5*	R234 ... H1,*C3*	RV129... E3,*A3*	
A5,*C5*	R115 ... D1,*B2*	R135 ... F1,*C2*	R153 ... F1,*C2*	R169 ... G3,*C1*	R186 ... E4,*B3*	R206 ... C4,*B5*	R220 ... D4,*B5*	R235 ... H1,*C3*	RV133... F1,*C2*	SK
	R116 ... E1,*B2*	R136 ... F2,*C3*	R154 ... G1,*C2*	R170 ... G3,*B1*	R187 ... E4,*B3*	R207 ... C4,*B5*	R221 ... D5,*B5*	R236 ... D3,*B4*	RV141... F1,*C1*	
A2,*A1*	R119 ... B3,*C3*	R137 ... E2,*C3*	R155 ... G1,*C2*	R171 ... F3,*B1*	R188 ... C4,*A1*	R208 ... D5,*B5*	R222 ... D4,*B5*	R237 ... D3,*B4*	RV147... F1,*C2*	T1
A3,*A1*	R121 ... D1,*A2*	R139 ... C2,*B3*	R156 ... G1,*C2*	R172 ... F4,*A3*	R190 ... F5,*A3*	R209 ... D5,*B5*	R223 ... D4,*B5*	R240 ... D3,*B4*	RV150... G1,*C3*	T1
B1,*C3*	R123 ... E2,*A3*	R140 ... C2,*B3*	R157 ... E2,*C3*	R173 ... H2,*B2*	R191 ... F4,*B3*	R210 ... C5,*B5*	R225 ... D5,*A5*	R241 ... D3,*C4*	RV166... G3,*C1*	T1
B2,*C3*	R124 ... C1,*A2*	R142 ... F1,*C2*	R158 ... E2,*B3*	R175 ... G1,*C1*	R192 ... F5,*A3*	R211 ... C4,*B5*	R226 ... D5,*A5*	R245 ... C5,*B3*	RV174... E1,*B2*	
D3,*B2*	R125 ... C1,*A2*	R143 ... F1,*C2*	R159 ... E2,*A2*	R176 ... G3,*C2*	R193 ... E5,*B2*	R212 ... C4,*B5*	R227 ... C5,*B3*	R247 ... A1,*A2*	RV179... H1,*C1*	TR
B2,*B1*	R126 ... E2,*B3*	R144 ... E1,*B3*	R161 ... H3,*B2*	R177 ... H1,*C1*	R194 ... F5,*A3*	R213 ... C4,*A3*	R228 ... C5,*B3*	R248 ... C4,*A1*	RV180... F3,*C2*	TR
B3,*A1*	R127 ... E1,*C3*	R145 ... G1,*C2*	R162 ... H3,*B2*	R178 ... H1,*C1*	R195 ... F4,*A3*	R214 ... C5,*A3*	R229 ... D5,*A5*	R249 ... D3,*A4*	RV202... F5,*A3*	TR
B2,*B1*	R128 ... E3,*A3*	R146 ... G1,*C2*	R163 ... H3,*B1*	R181 ... B3,*A2*	R198 ... E4,*A3*	R215 ... C5,*B3*	R230 ... D5,*B3*	R250 ... E4,*A4*	RV224... D4,*A5*	TR
C2,*B2*	R130 ... C3,*B3*	R148 ... G1,*C1*	R164 ... G3,*C1*	R182 ... B3,*A2*	R199 ... E4,*B3*	R216 ... C5,*A3*	R231 ... D4,*B4*	R251 ... E3,*B4*		TR
E1,*B3*	R131 ... D3,*B3*	R149 ... G1,*C2*	R165 ... G3,*C1*	R183 ... B3,*A2*	R200 ... E5,*A3*	R217 ... C5,*B3*	R232 ... D5,*B4*		S101 ... B5,*C5*	TR



F G H

... F5,*A3*
... F5,*A4*
... C4,*B5*
... C4,*B5*
... D5,*B5*
... D5,*B5*
... C5,*B5*
... C4,*B5*
... C4,*B5*
... C4,*A3*
... C5,*A3*
... C5,*B3*
... C5,*A3*
... C5,*B3*

R218 ... C5,*A3*
R219 ... D4,*B5*
R220 ... D4,*B5*
R221 ... D5,*B5*
R222 ... D4,*B5*
R223 ... D4,*B5*
R225 ... D5,*A5*
R226 ... D5,*A5*
R227 ... C5,*B3*
R228 ... C5,*B3*
R229 ... D5,*A5*
R230 ... D5,*B3*
R231 ... D4,*B4*
R232 ... D5,*B4*

R233 ... H3,*C3*
R234 ... H1,*C3*
R235 ... H1,*C3*
R236 ... D3,*B4*
R237 ... D3,*B4*
R240 ... D3,*B4*
R241 ... D3,*C4*
R245 ... C5,*B3*
R247 ... A1,*A2*
R248 ... C4,*A1*
R249 ... D3,*A4*
R250 ... E4,*A4*
R251 ... E3,*B4*

RV113... E1,*C1*
RV129... E3,*A3*
RV133... F1,*C2*
RV141... F1,*C1*
RV147... F1,*C2*
RV150... G1,*C3*
RV166... G3,*C1*
RV174... E1,*B2*
RV179... H1,*C1*
RV180... F3,*C2*
RV202... F5,*A3*
RV224... D4,*A5*

S101 ... B5,*C5*

SF101... C2,*B2*

SK101... C3,*A2*

T101 ... A4,*
T102 ... E4,*A4*
T103 ... C5,*B3*

TR100... B3,*C4*
TR101... E2,*C3*
TR102... G3,*C1*
TR104... F4,*A3*
TR105... F5,*A3*
TR107... C4,*A5*

TR108... C4,*B5*
TR109... C5,*A3*
TR110... C5,*A3*
TR111... D4,*B5*
TR112... D5,*B3*
TR113... C5,*B3*
TR114... H1,*C3*
TR120... C3,*A2*
TR121... C3,*A2*
TR123... C3,*A2*
TR124... C4,*A2*
TR125... C4,*A2*
TR126... E3,*A4*

XL1 ... G3,*C2*

Z1 ... A3,*A1*
Z102 ... B5,*C5*

PC1141

C602 ... G4,*A1*
C603 ... G4,*A2*
C604 ... G5,*A2*
C605 ... H5,*C2*

R602 ... G3,*B2*
R603 ... G4,*A2*
R604 ... G4,*A2*
R605 ... G3,*B2*
R606 ... G4,*A2*
R607 ... G5,*A2*
R608 ... G4,*C2*
R609 ... G4,*B1*
R610 ... G3,*A1*
R611 ... F4,*A2*
R612 ... G5,*A1*
R613 ... G4,*B2*
R614 ... G5,*B2*
R615 ... G5,*B2*
R616 ... G4,*A1*
R617 ... G4,*A2*
R621 ... G5,*A2*
R622 ... G4,*A1*
R623 ... G4,*A2*
R627 ... G5,*A2*
R628 ... H5,*C2*
R629 ... G5,*B2*
R630 ... G5,*B2*
R633 ... G3,*B2*

RV624... F4,*A1*
RV625... F4,*A2*
RV626... F5,*A1*

SG601... G4,—
SG602... G4,—
SG603... G4,—
SG604... H4,—
SG605... H4,—

TR601... G3,*B1*
TR602... G4,*B2*
TR603... G5,*B1*

**Cabinet mounted*

221

TX90

24 MAY 19[illegible]

FERGUSON | TX

TX90 COLOUR TV

Provisional Service Information

Model 14C1

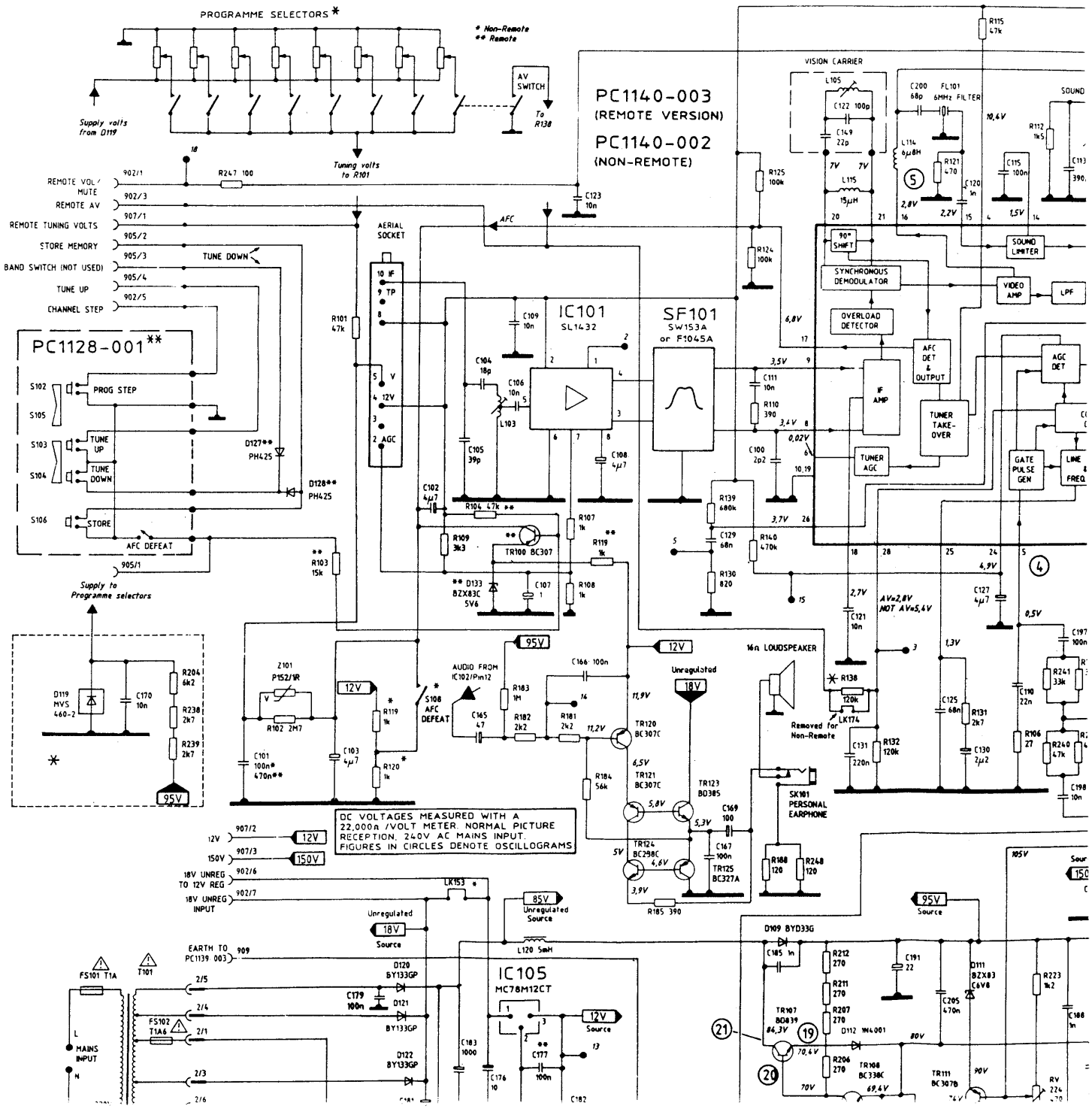
8-Programme Non- Remote

Model 14C2

16-Programme Remote Control v
Manual Sweep-Tune System U7

Models 14C1 and 14C2 are fitted w
14-inch (V34 cm) picture tubes

FERGUSON *is a registered trade mark of THORN EMI plc.*



24 MAY 1986

14C1 14C2

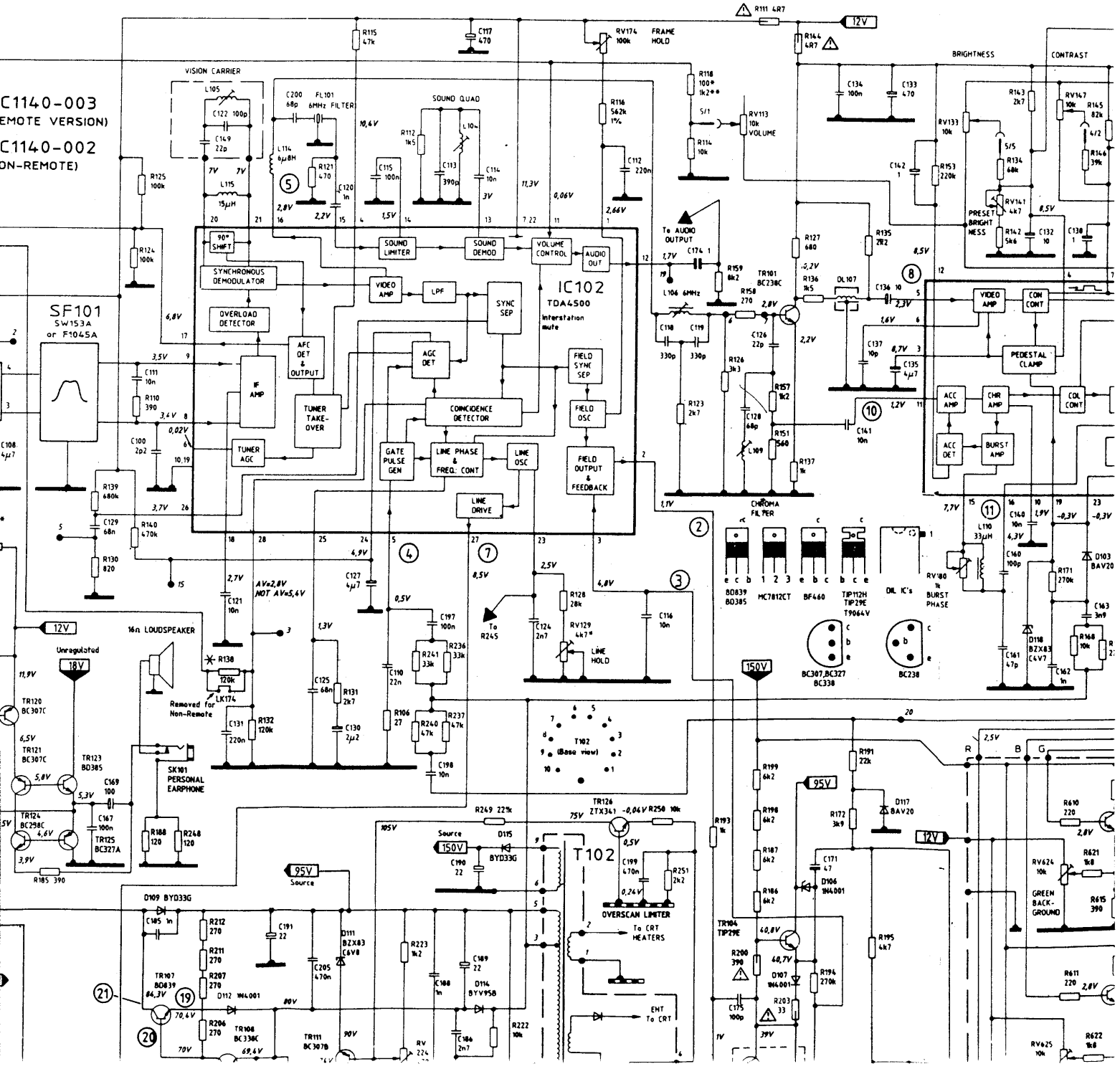
Model 14C1

8-Programme Non-Remote

Model 14C2

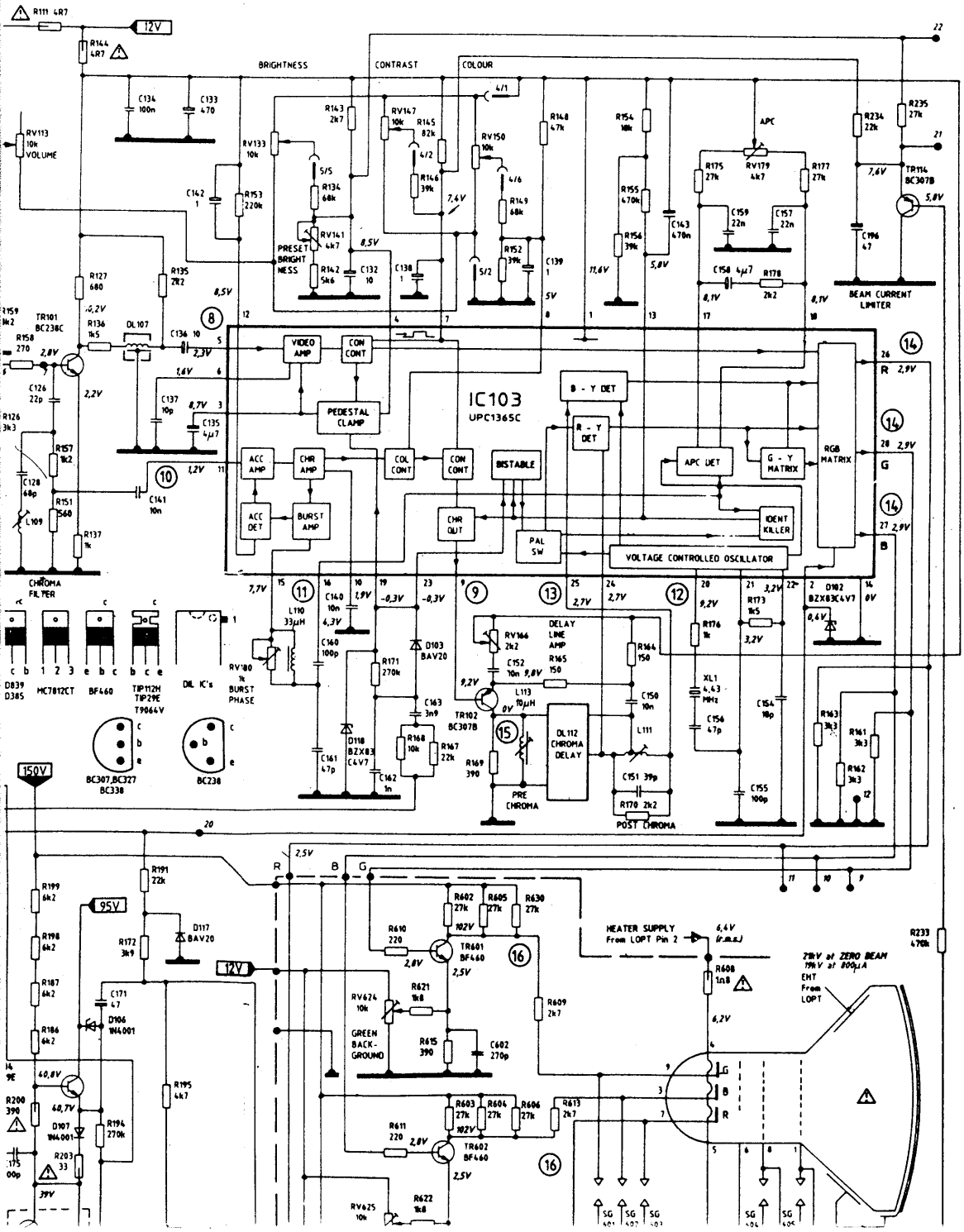
16-Programme Remote Control with Manual Sweep-Tune System U740

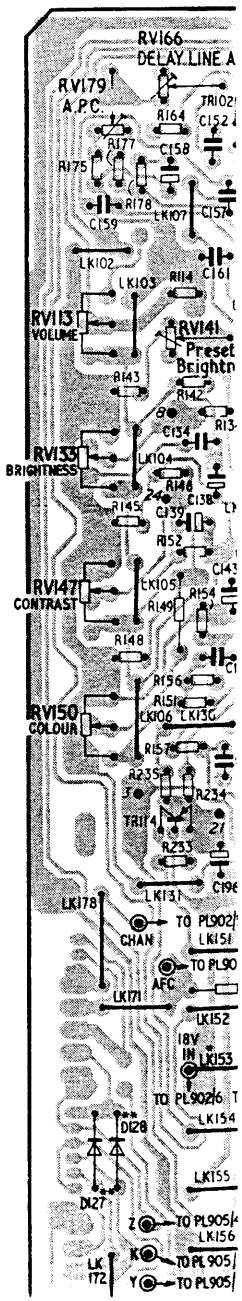
Models 14C1 and 14C2 are fitted with 14-inch (V34 cm) picture tubes



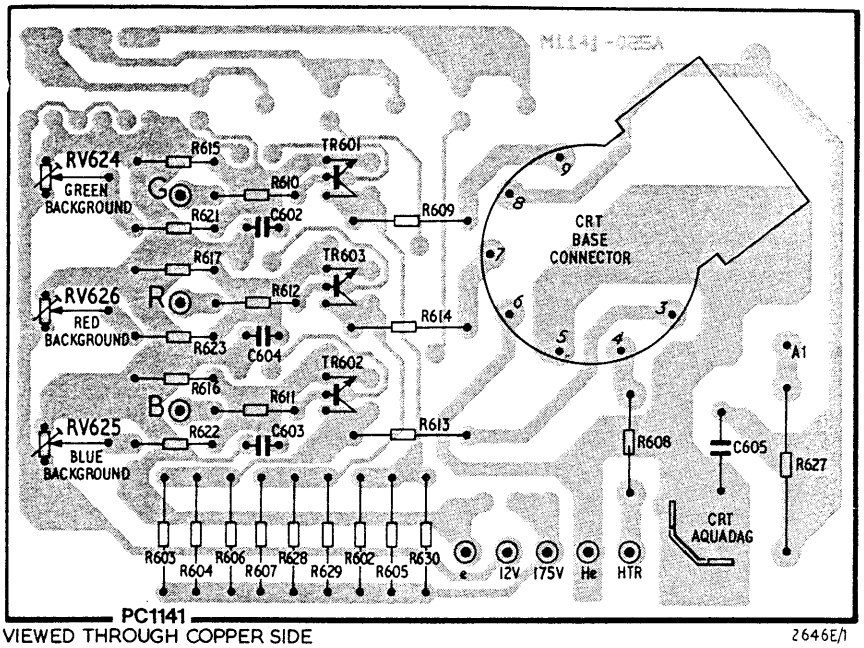
1402

CRT Base PC1141-001



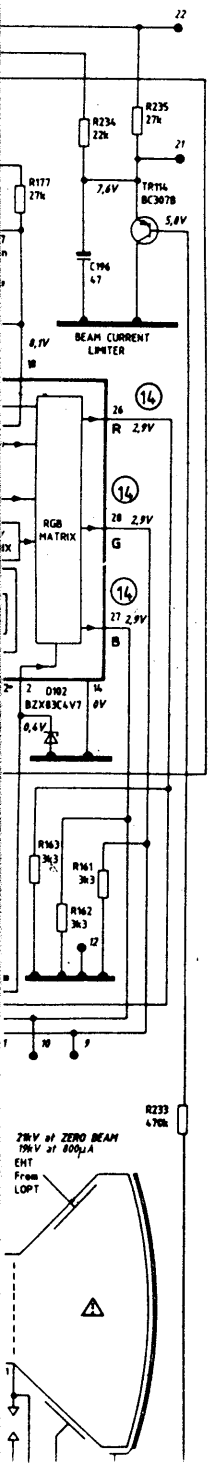


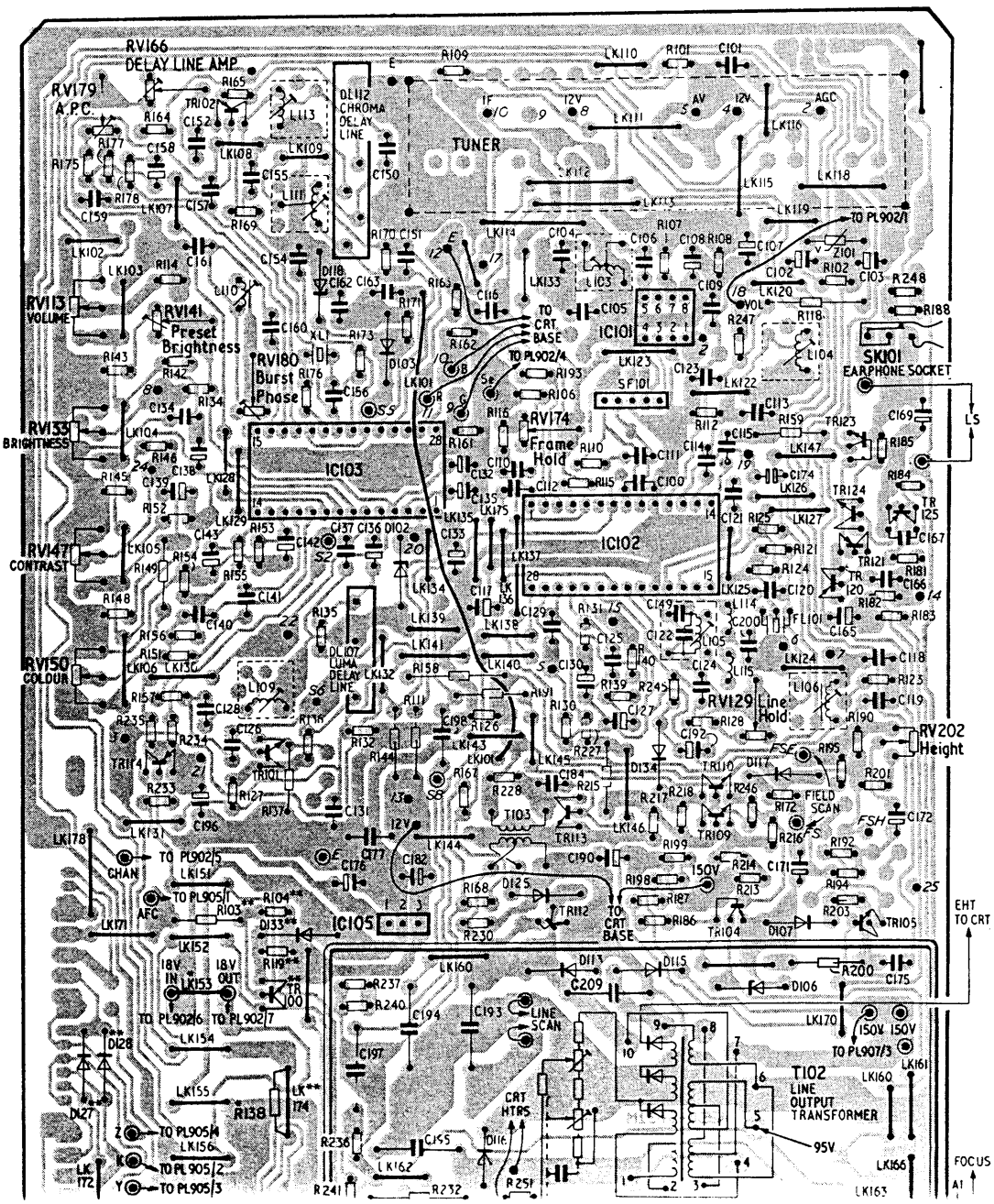
CRT Base PC1141-001

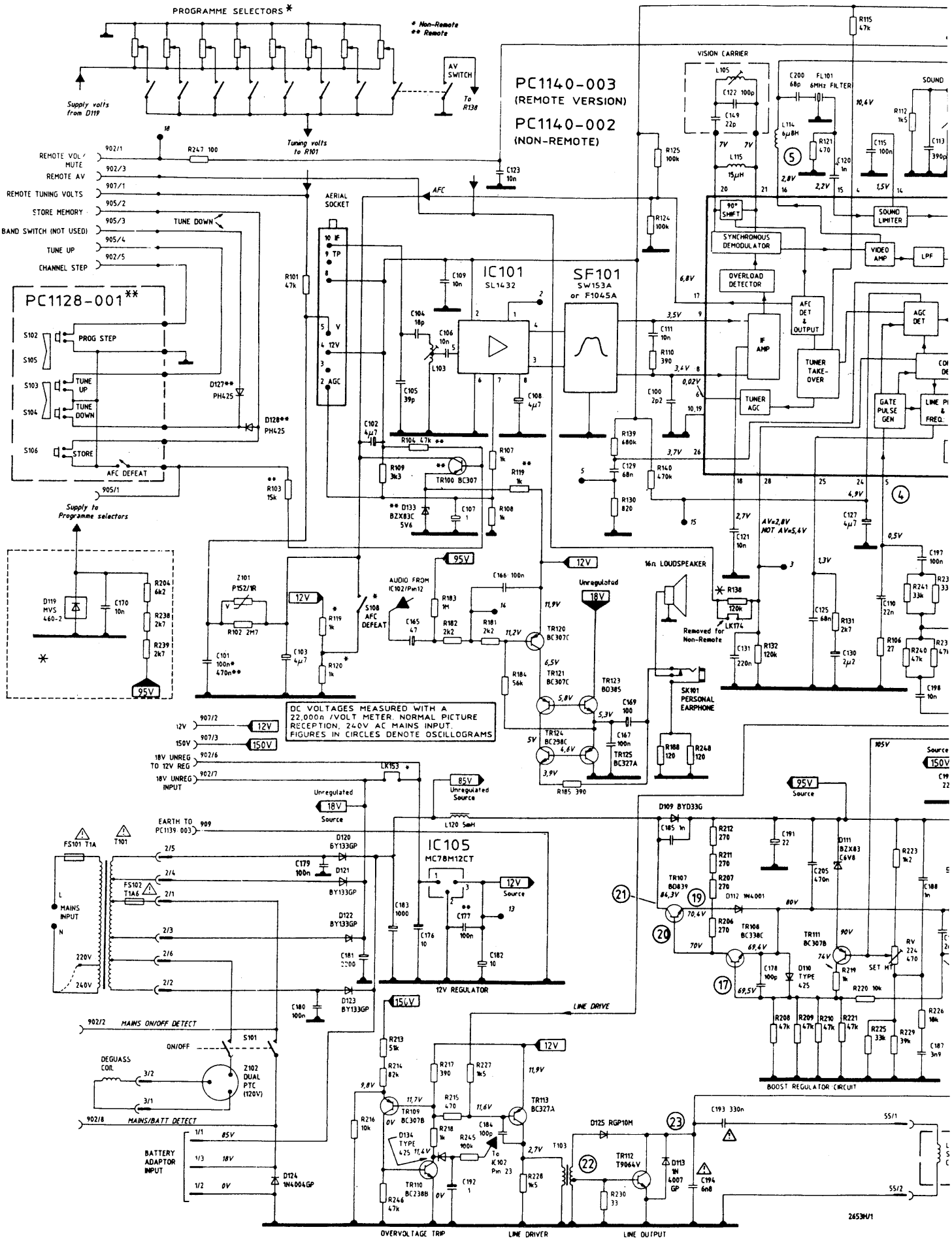


PC1141
VIEWED THROUGH COPPER SIDE

2646E/1



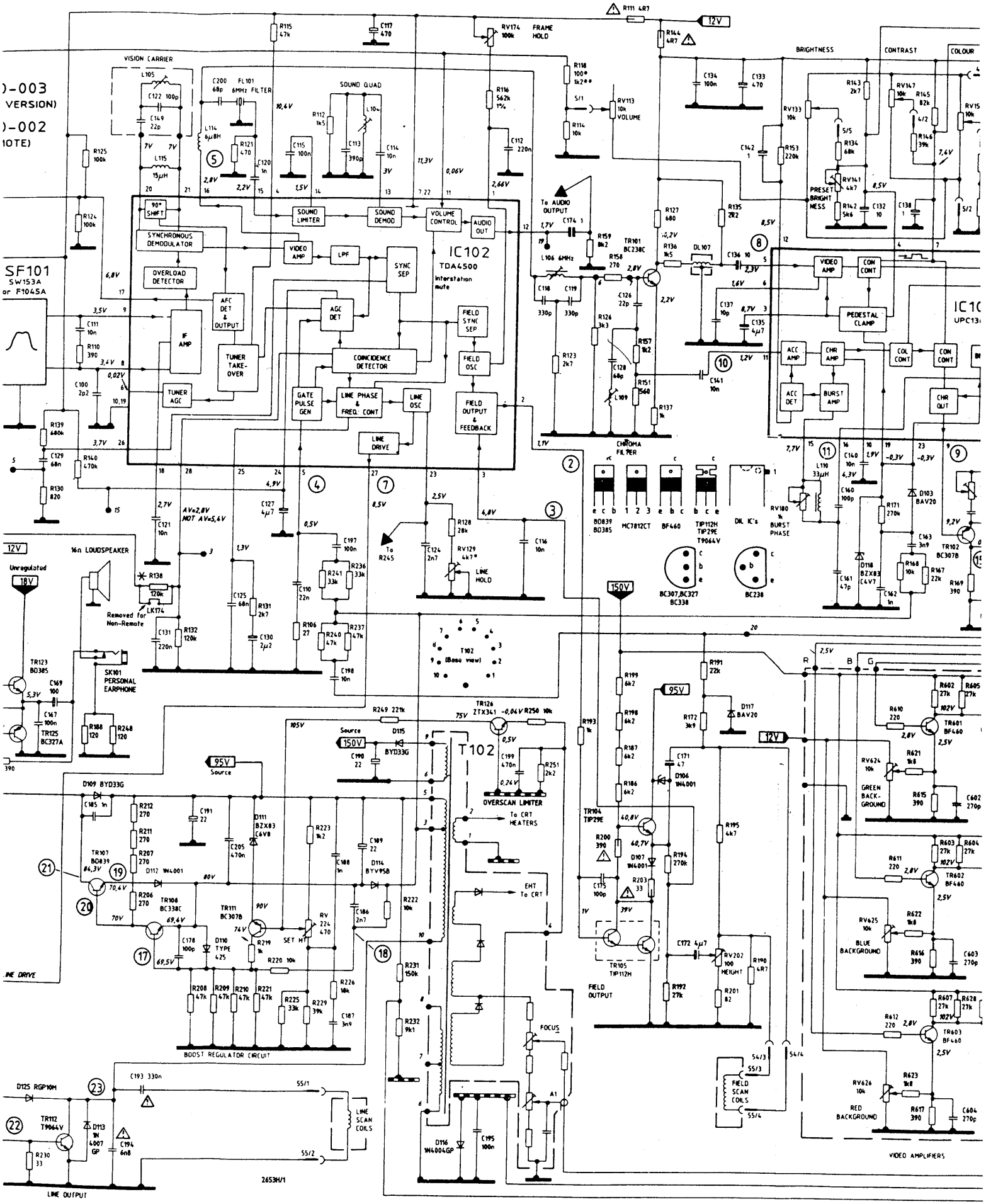




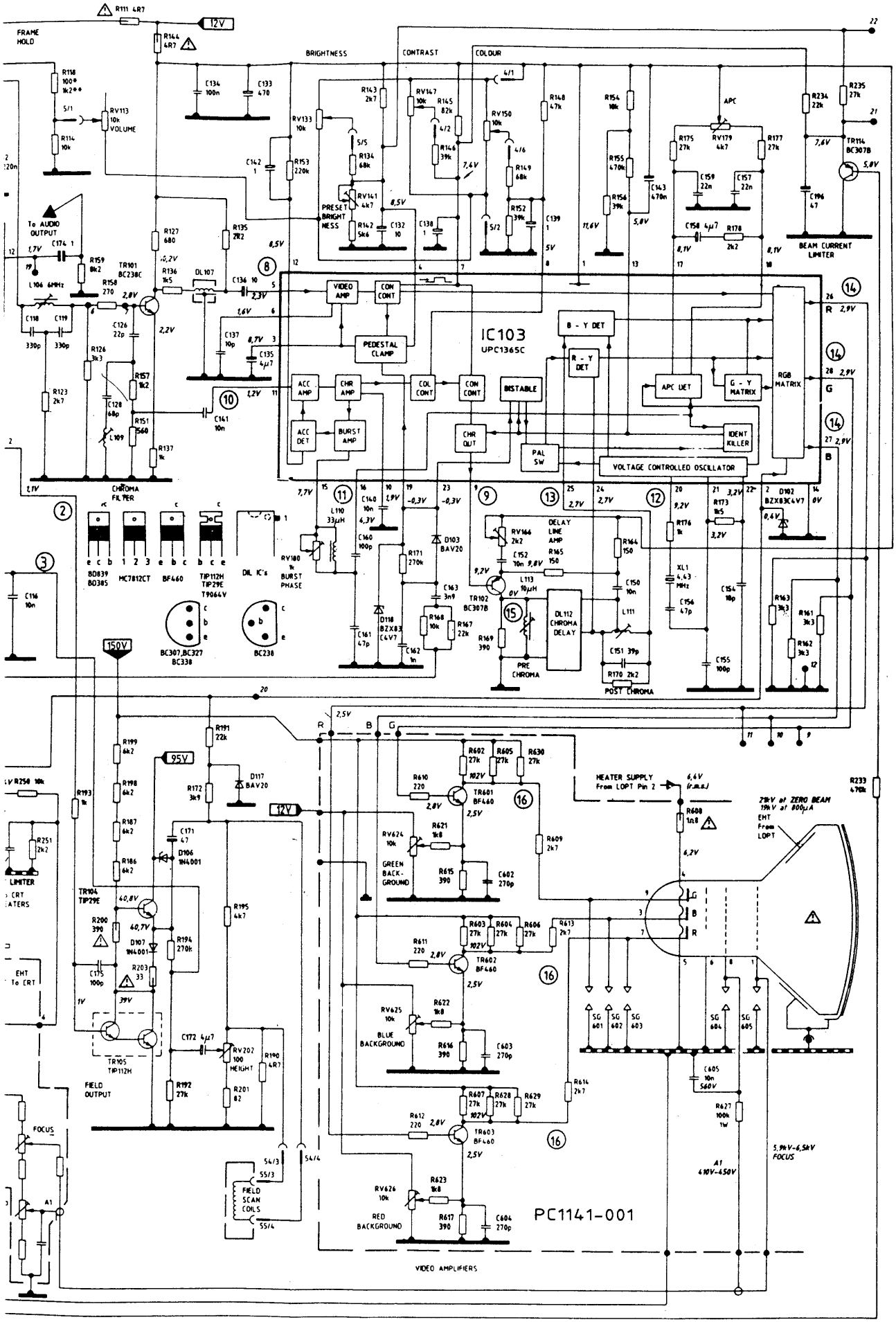
Main Receiver PC114
PC1140-003 (Model

1185E 10P1-060-001

TPH1423

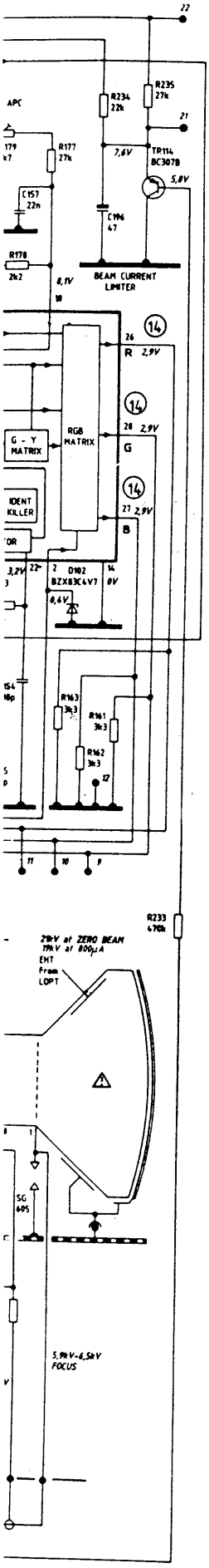


Main Receiver PC1140-002 (Model 14C1), PC1140-003 (Model 14C2) and CRT Base PC1141-001



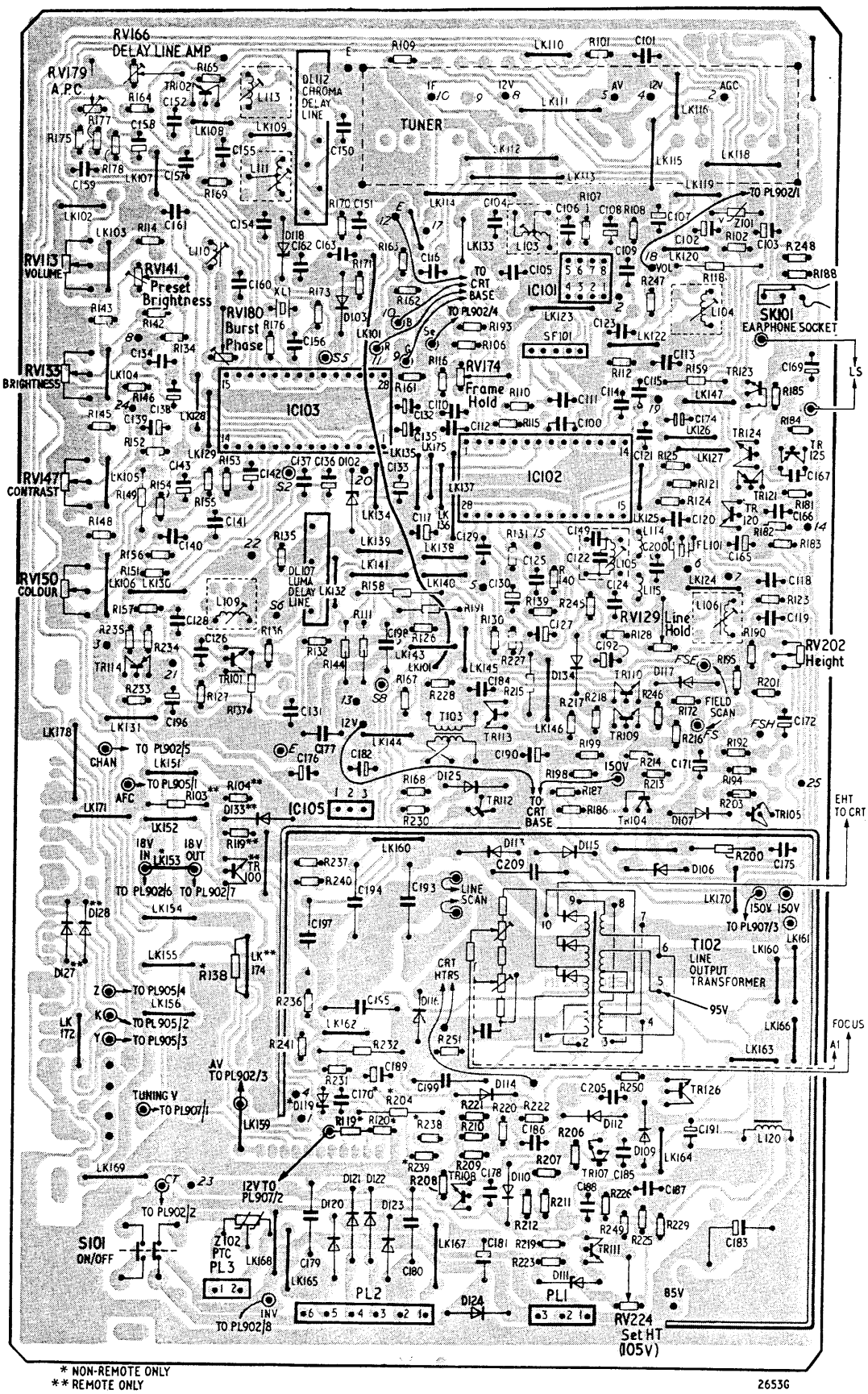
el 14C1),

RT Base PC1141-001



PC1141
VIEWED THROUGH COPPER SIDE

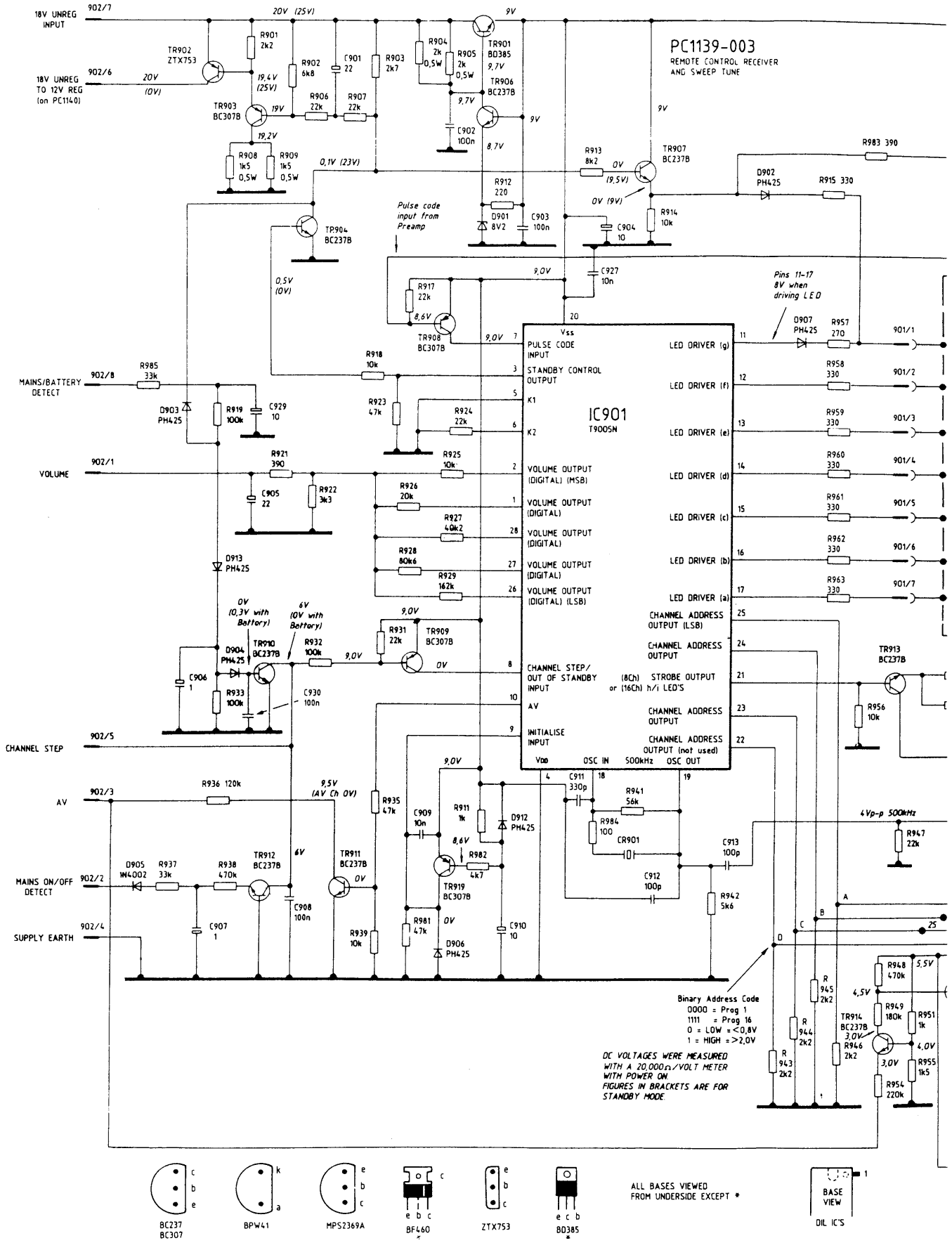
2646E/1



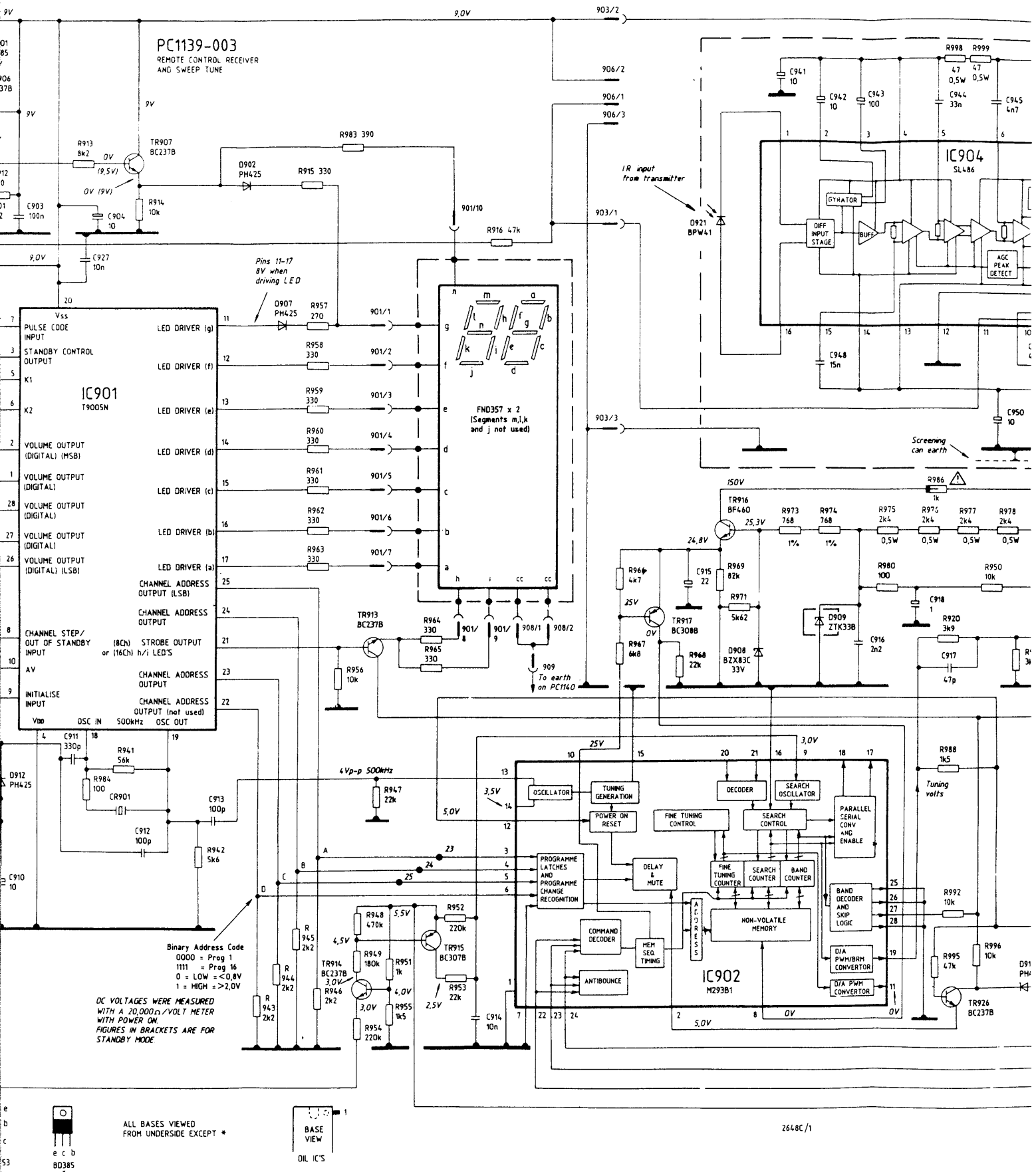
* NON-REMOTE ONLY
** REMOTE ONLY

2653G

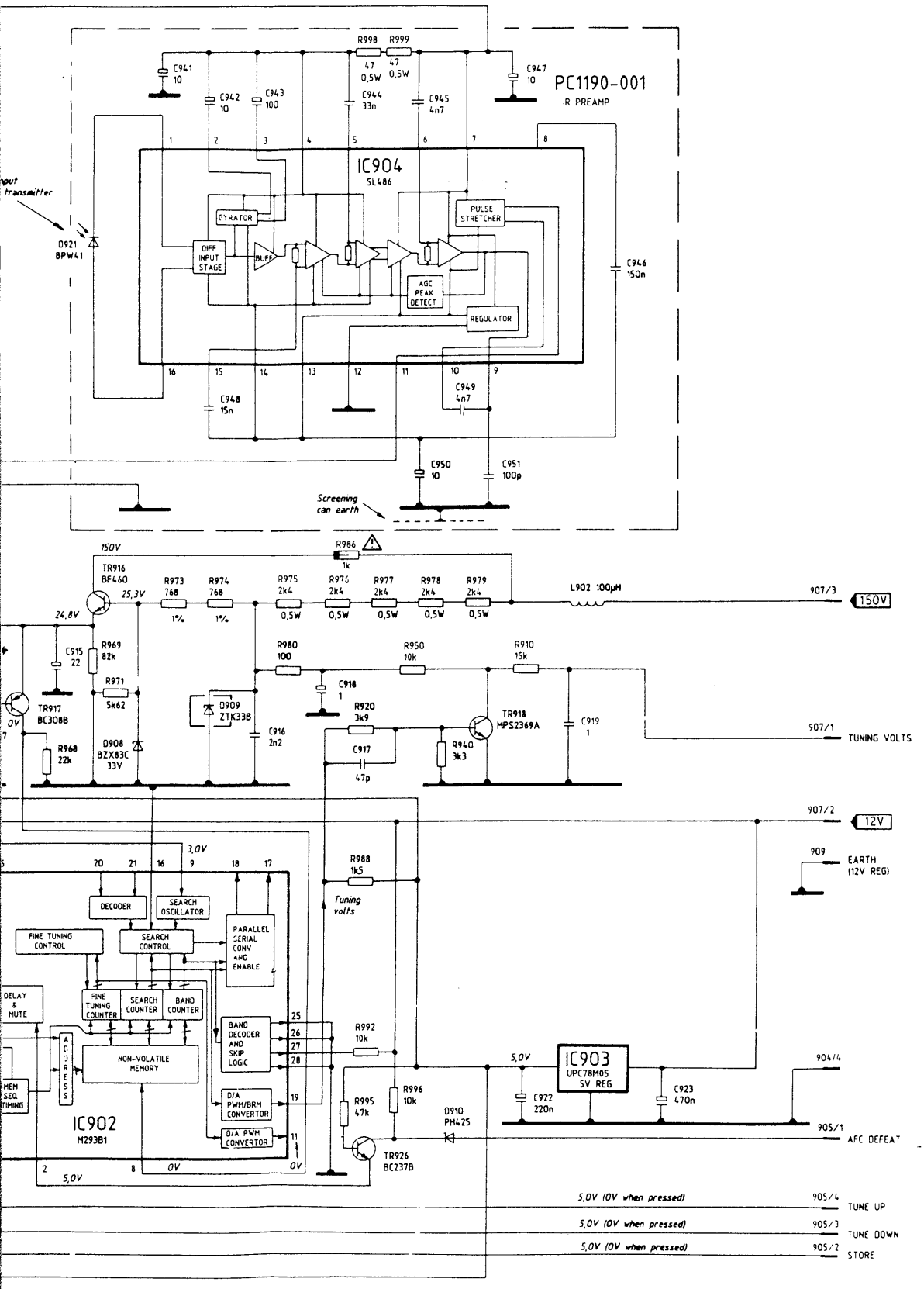
Main Receiver Board PC1140-002 (Model 14C1) and PC1140-003 (Model 14C2)

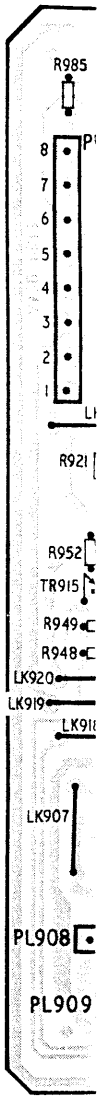

PC1139-003
REMOTE CONTROL RECEIVER AND SWEEP TUNE
IC901
T9005N
18V UNREG INPUT
902/7
18V UNREG TO 12V REG (on PC1140)
902/6
MAINS/BATTERY DETECT
902/8
VOLUME
902/1
CHANNEL STEP
902/5
AV
902/3
MAINS ON/OFF DETECT
902/2
SUPPLY EARTH
902/4
Pulse code input from Preamp
Pins 11-17 8V when driving LED
PULSE CODE INPUT
STANDBY CONTROL OUTPUT
VOLUME OUTPUT (DIGITAL) (MSB)
VOLUME OUTPUT (DIGITAL)
VOLUME OUTPUT (DIGITAL)
VOLUME OUTPUT (DIGITAL)
VOLUME OUTPUT (DIGITAL) (LSB)
CHANNEL STEP/ OUT OF STANDBY INPUT
AV
INITIALISE INPUT
LED DRIVER (g)
LED DRIVER (f)
LED DRIVER (e)
LED DRIVER (d)
LED DRIVER (c)
LED DRIVER (b)
LED DRIVER (a)
CHANNEL ADDRESS OUTPUT (LSB)
CHANNEL ADDRESS OUTPUT
STROBE OUTPUT (8Ch) or (16Ch) h/i LED'S
CHANNEL ADDRESS OUTPUT
CHANNEL ADDRESS OUTPUT (not used)
Vss
Vdd
OSC IN
500kHz
OSC OUT
Binary Address Code
0000 = Prog 1
1111 = Prog 16
0 = LOW = <0,8V
1 = HIGH = >2,0V
DC VOLTAGES WERE MEASURED WITH A 20,000Ω/VOLT METER WITH POWER ON. FIGURES IN BRACKETS ARE FOR STANDBY MODE.
4Vp-p 500kHz
ALL BASES VIEWED FROM UNDERSIDE EXCEPT *
BC237 BC307
BPW41
MPS2369A
BF460*
ZTX753
BD385*
BASE VIEW
DIL IC'S

Re

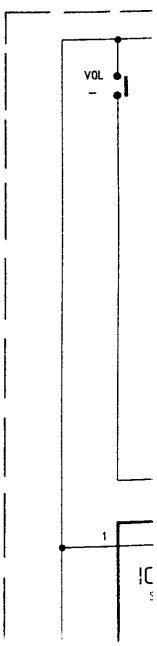


Remote Control Receiver and Sweep-Tune PC1139-C

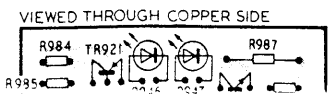


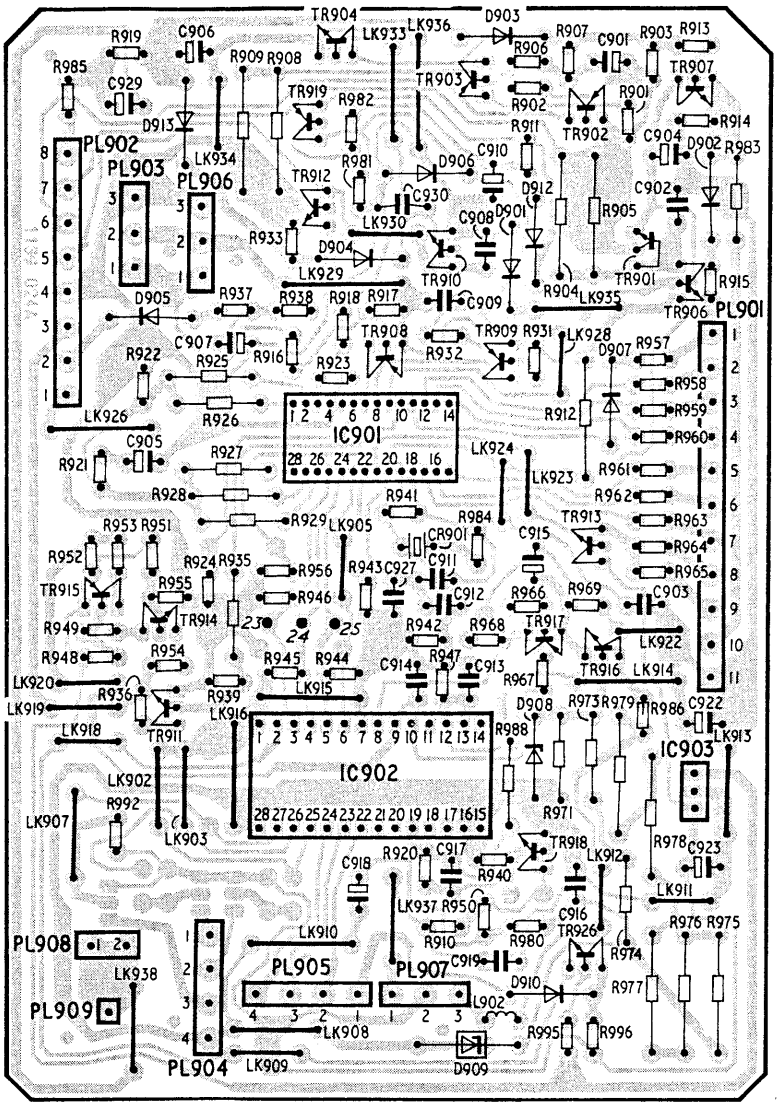


Remo



eiver and Sweep-Tune PC1139-003





2648B/I

Remote Control and Sweep-Tune Board PC1139-003

907/3 150V

907/1 TUNING VOLTS

907/2 12V

909 EARTH (12V REG)

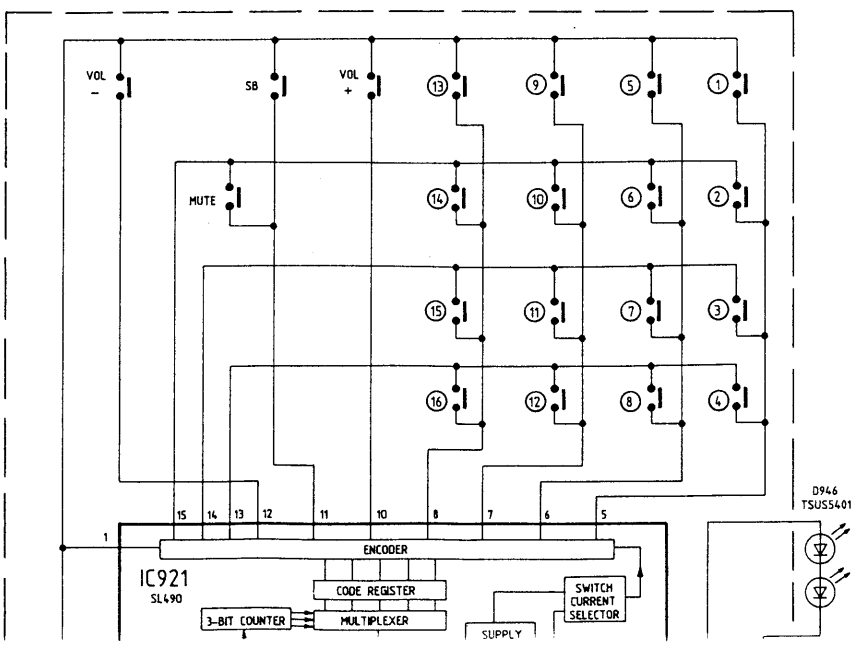
904/4

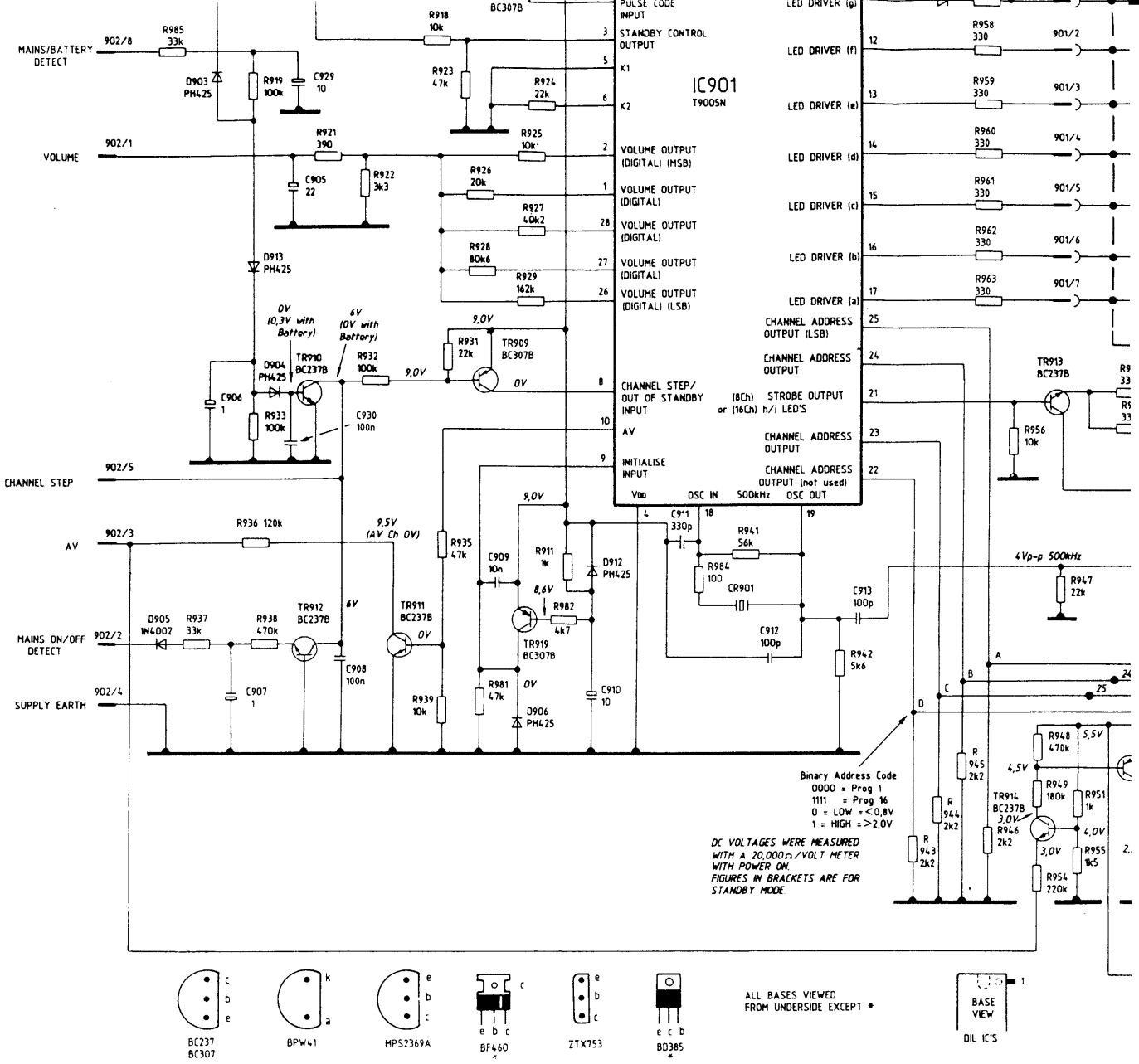
905/1 AFC DEFEAT

905/4 TUNE UP

905/3 TUNE DOWN

905/2 STORE





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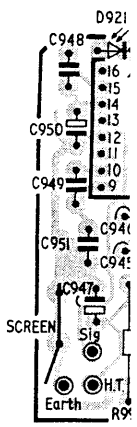

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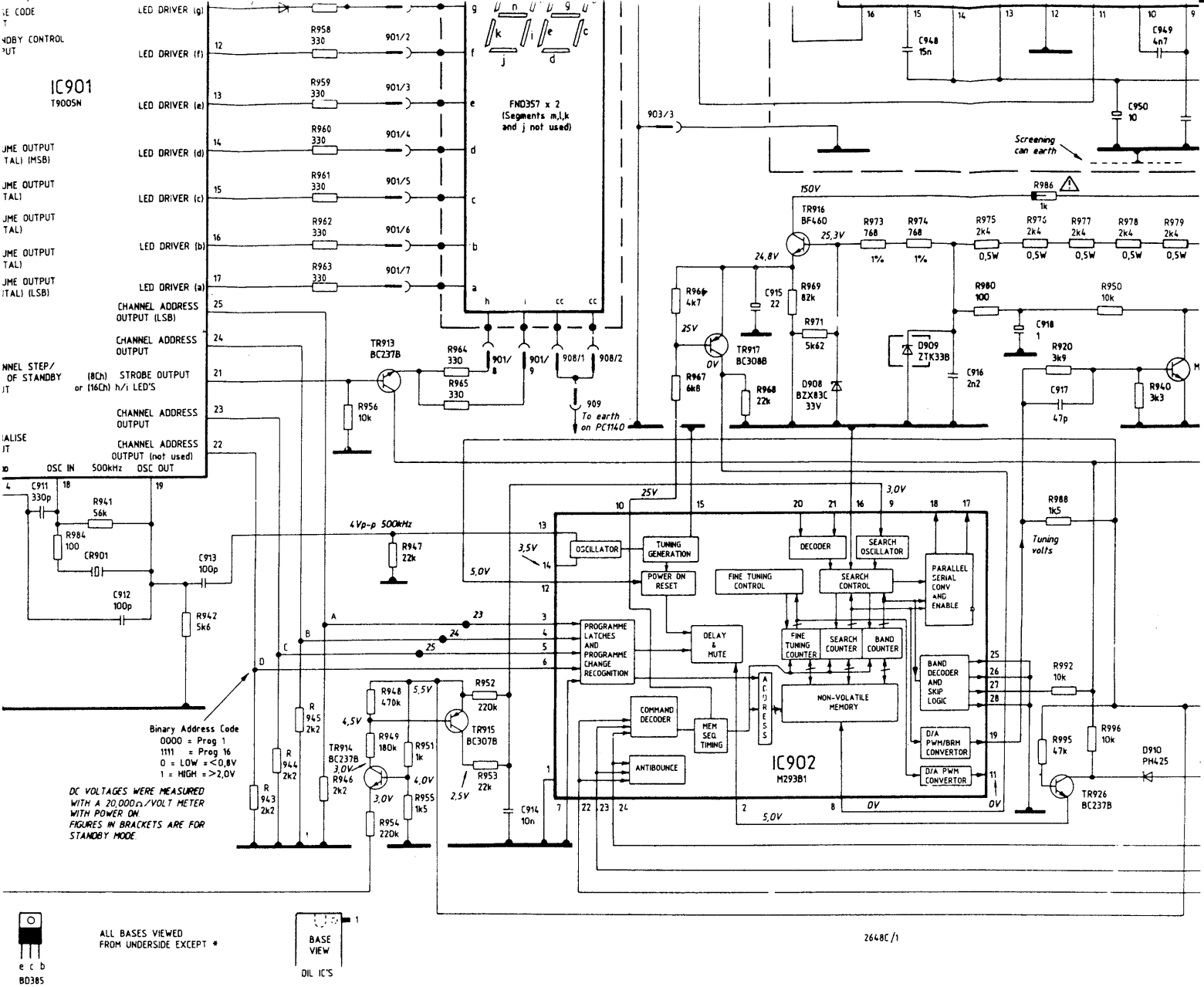
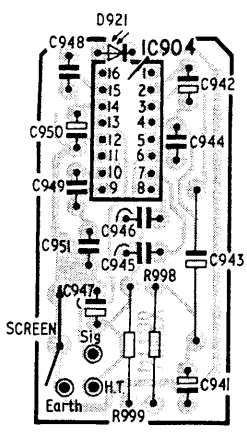
Infra-Re

PC1190-

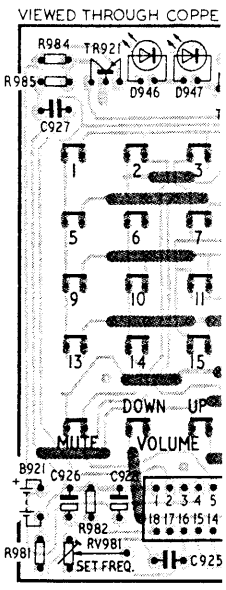


Remote Control Receiver and Sweep-Tune PC1139-003



2648E

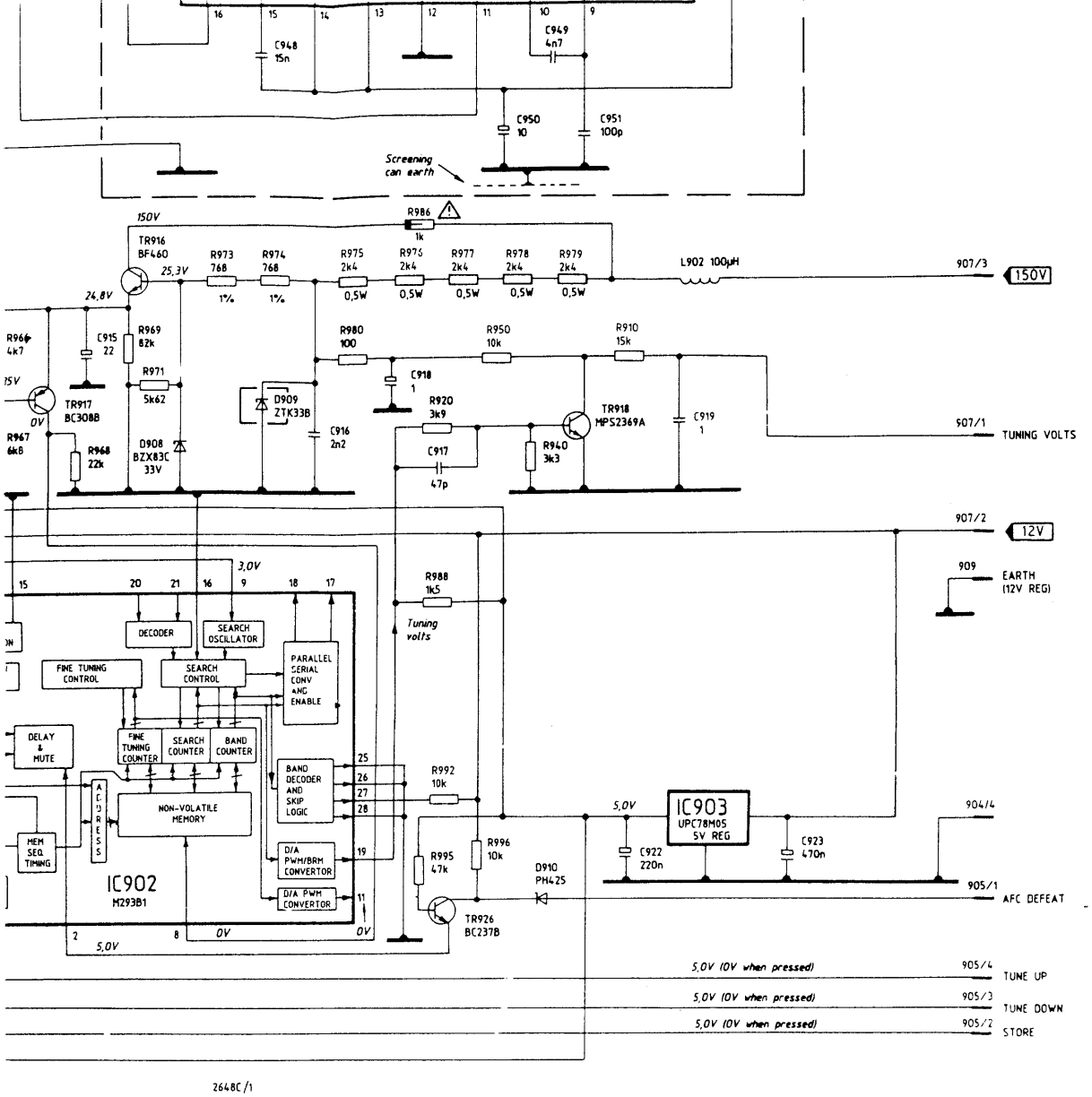
Infra-Red Preamp PC1190-001



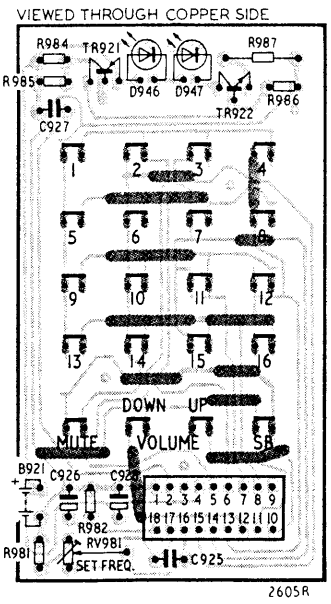
T740 Transmit

ted

n N18 3BP



ceiver and Sweep-Tune PC1139-003



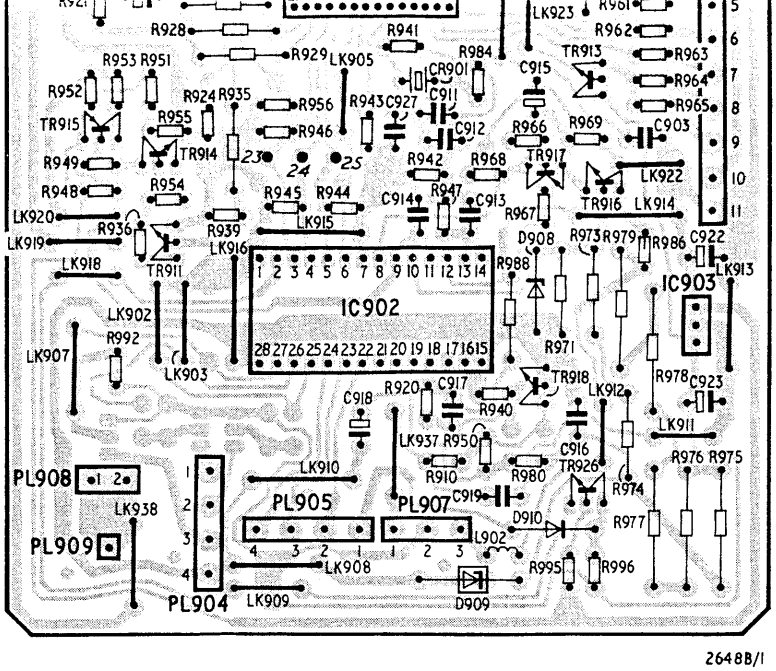
T740 Transmitter PC1159

907/3 150V

907/1 TUNING VOLTS

907/2 12V

909 EARTH (12V REG)



2648B/1

Remote Control and Sweep-Tune Board PC1139-003

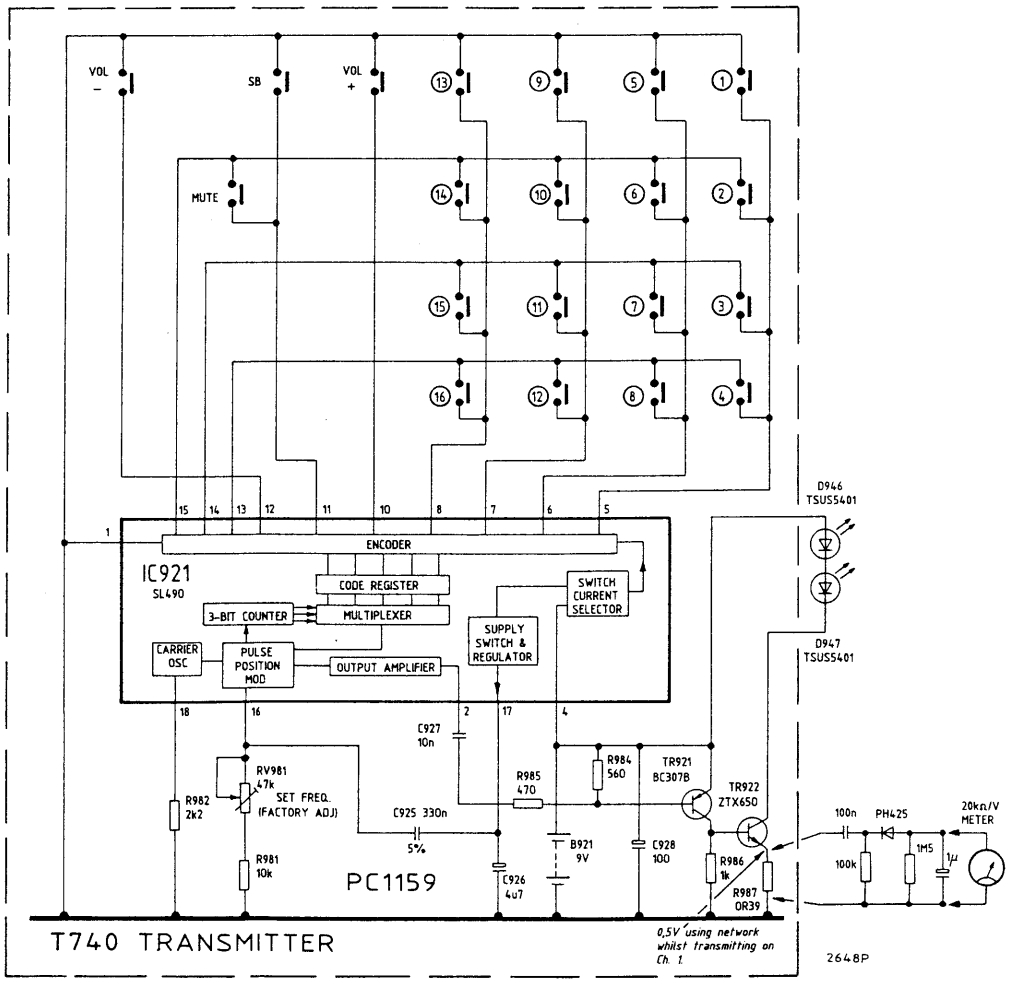
904/4

905/1 AFC DEFEAT

905/4 TUNE UP

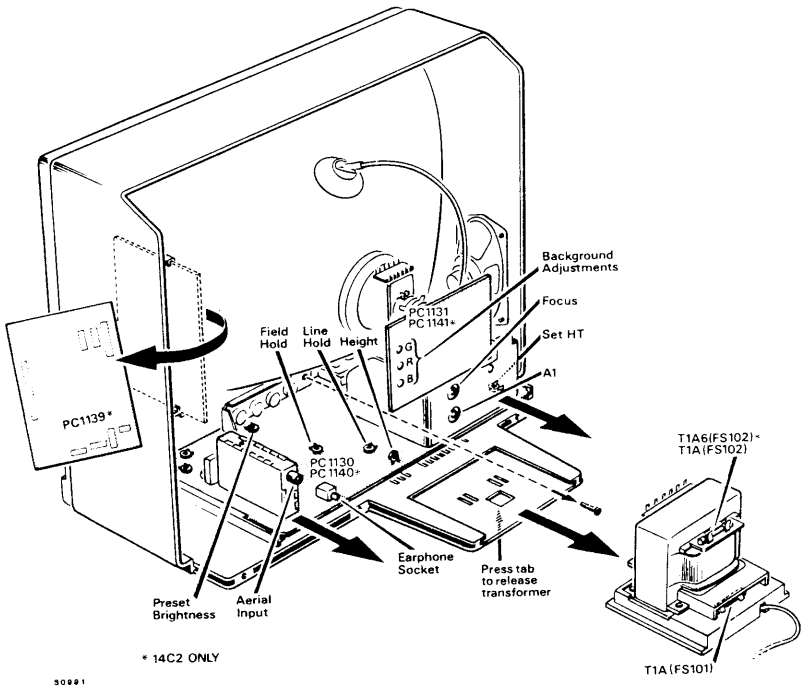
905/3 TUNE DOWN

905/2 STORE



T740 Transmitter

ACCESS FOR SERVICE (14C1 and 14C2)



Specification

Model 14C1

Generally as specification for TX90 – see Section A, front page.

Model 14C2

Generally as TX90 Section A with the following changes.

Power Consumption

Typically 53W with nominal picture, 59·3W maximum and 46·3W at zero beam (240V a.c. mains). Battery operation (with TA127B Converter fitted) 5A maximum at 12V.

Remote Control Characteristics

See Section B front page but note 16-channel capacity instead of 8-Channel.

Models 16A1 and 16A2

Generally as 14C1 and 14C2 respectively but with revised power consumption figures as follows:

Typically 55W with normal picture, 65W maximum and 42W at zero beam (240V a.c. mains).

WARNING

EHT Shock Hazard

The EHT must be safely discharged before disconnecting the lead from the tube anode cap.

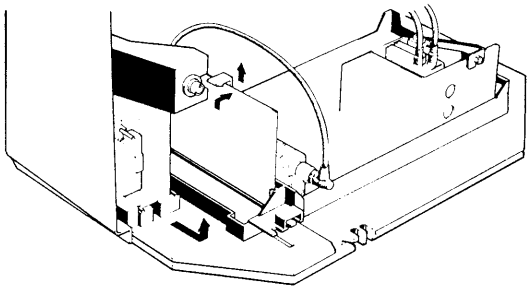
Using a convenient lead such as a meter lead, clip one end to the aquadag braid, fold back the suction cap and discharge the EHT with the lead.

Press in one side of the spring clip which projects into the tube cavity to ease removal of the connector.

IMPORTANT: Do not disturb the tube neck adjustments. These have been set for optimum performance during tube manufacture.

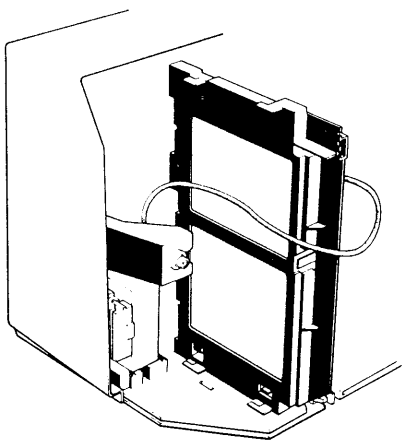
ACCESS FOR SERVICE (16A1 and 16A2)

1



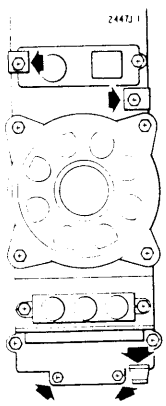
Sliding out main panel and R.C. receiver assembly*
(*16A2 only)

2



PCB in servicing position

3



Removing facia panel.

COMPONENT DETAILS

When ordering replacements, quote model number, component reference description, part number and printed board number.

⚠ **Denotes safety components—see note on Circuit Diagram sheet.**

Each description and part number is followed by the component function.

Main Panel, PC1140

14C2, Part no. 02M4-003-003

16A1, Part no. 02M4-003-008

16A2, Part no. 02M4-003-009

Unless otherwise stated, information applies to all versions.

Differences are covered by the following notation:

* 14C2 and 16A2
** 16A2
*** 14C2
† 16A1 and 16A2
†† 16A1

For Model 14C1 refer to Component Details on page A8 of Section A, with the modifications listed on page G6.

RESISTORS

R101 47kΩ 5% 0·25W, R5470-GF02-14RG
Tuning voltage feed

R102 2·7MΩ 5% 0·25W, R7270-GF02-15RG
AFC feed resistor

R103* 15kΩ 5% 0·25W, R5150-GF02-01RG
Part of AFC defeat network with R104 and TR100

R104* 47kΩ 5% 0·25W, R5470-GF02-14RG
See R103

R106 27Ω 5% 0·25W, R2270-GF02-14RG
Line flyback integration, with C110 etc.

R107 1kΩ 5% 0·25W, R4100-GF02-15RG
RF AGC potential divider with R108

R108 1kΩ 5% 0·25W, R4100-GF02-15RG
RF AGC potential divider, with R107

R109 3·3kΩ 5% 0·16W, R4330-GF01-43RG
AGC potential divider

R110 390Ω 5% 0·25W, R3390-GF02-14RG
Impedance matching, SF101 output, with C111

R111 4·7Ω 5% 0·25W, R1470-GF02-17RG
12V rail decoupling and feed, with C133, to IC103

R112 1·5kΩ 5% 0·25W, R4150-GF02-14RG
L104 damping resistor

R114 10kΩ 5% 0·25W, R5100-GF02-14RG
Volume control parallel resistor

R115 47kΩ 5% 0·25W, R5470-GF02-14RG
Tuner takeover load, IC102 pin 4

R116 562kΩ 1% 0·25W, (metal film), R6562-BM02-16RG
Field osc. time constant, with C112 (IC102 pin 1)

R118* 1·2kΩ 5% 0·25W, R4120-GF02-01RG

R118†† 100Ω 5% 0·25W, R3100-GF02-01RG
Part Volume control network

R119 1kΩ 5% 0·25W, R4100-GF02-14RG
AFC defeat switch reference feed

R120†† 1kΩ 5% 0·25W, R4100-GF02-15RG
AFC switch ref. pot. divider, with R119

R121 470Ω 5% 0·25W, R3470-GF02-14RG
FL1 output impedance matching

R123 2·7kΩ 5% 0·16W, R4270-GF01-43RG
Part intercarrier rejector, with L106, C118 and C119

R124 100kΩ 5% 0·25W, R6100-GF02-14RG
AFC reference voltage divider, with R125

R125 100kΩ 5% 0·25W, R6100-GF02-14RG
See R124

R126 3·3kΩ 5% 0·25W, R4330-GF02-14RG
TR101 base bias

R127 680Ω 5% 0·25W, R3680-GF02-14RG
TR101 collector load

R128 28kΩ 1% 0·25W, R5280-BM02-PH57
Line osc. external time constant with RV129 and C124

R130 820Ω 5% 0·25W, R3820-GF02-14RG
Sync separator clipper time constant, with C129 and R139

R131 2·7kΩ 5% 0·25W, R4270-GF02-14RG
Part line osc. external loop filter, with C125 and C130

R132 120kΩ 5% 0·25W, R6120-GF02-14RG
Coincidence detector time constant with C131, IC102 pin 28

R134 68kΩ 5% 0·25W, R5680-GF02-14RG
Brightness control feed to Preset Brightness circuit and IC103 pin 4

R135 2·2kΩ 5% 0·25W, R4220-GF02-14RG
Luma delay line terminating resistor

R136 1·5kΩ 5% 0·25W, R4150-GF02-14RG
Luma delay line feed resistor

R137 1kΩ 5% 0·25W, R4100-GF02-01RG
TR101 emitter resistor

R138†† 121kΩ 5% 0·16W, R6121-BM02-08RG
AV coincidence detector T.C., with C131 and C132

R139 680kΩ 5% 0·25W, R6680-GF02-14RG
See R130

R140 470kΩ 5% 0·25W, R6470-GF02-14RG
AGC gating time constant, with C127

R142 5·6kΩ 5% 0·25W, R4560-GF02-14RG
Part of brightness control network

R143 2·7kΩ 5% 0·25W, R4270-GF02-14RG
Part of brightness control network

R144 4·7Ω 5% 0·25W, R1470-GF02-17RG
12V line feed and decoupling, with C117 to IC102

R145 82kΩ 5% 0·25W, R5820-GF02-14RG
Part contrast control network to IC103 pin 7

R146 39kΩ 5% 0·25W, R5390-GF02-14RG
See R145

R148 47kΩ 5% 0·25W, R5470-GF02-14RG
Part colour control network to IC103

R149 68kΩ 5% 0·25W, R5680-GF02-01RG
See R148

R151 560Ω 5% 0·16W, R3560-GF01-43RG
Part chroma bandpass network, with R157, L109 and C128

R152 39kΩ 5% 0·25W, R5390-GF02-14RG
Part colour control network to IC103 pin 8

R153 220kΩ 5% 0·25W, R6220-GF02-14RG
ACC time constant, with C142

R154 18kΩ 5% 0·25W, R5180-GF02-14RG
Colour killer threshold pot. divider, with R156

R155 470kΩ 5% 0·25W, R6470-GF02-14RG
Colour killer current source

R156 39kΩ 5% 0·25W, R5390-GF02-14RG
See R154

R157 1·2kΩ 5% 0·16W, R4120-GF01-43RG
Part chroma bandpass network with R151

R158 270Ω 5% 0·25W, R3270-GF02-01RG
Part chroma filter network (TR101 base)

R159 8·2kΩ 5% 0·25W, R4820-GF02-01RG
Sound mute time constant at switch on, with C165

R161 3·3kΩ 5% 0·25W, R4330-GF02-14RG
Green video output terminating resistor

R162 3·3kΩ 5% 0·25W, R4330-GF02-14RG
Blue video output terminating resistor

R163 3·3kΩ 5% 0·25W, R4330-GF02-14RG
Red video output terminating resistor

R164 150Ω 5% 0·25W, R3150-GF02-14RG
TR102 emitter resistor, with R165

R165 150Ω 5% 0·25W, R3150-GF02-14RG
See R164

R167 22kΩ 5% 0·25W, R5220-GF02-14RG
PAL switch ident gating pedestal clamp feed, with R168

R168 10kΩ 5% 0·25W, R5100-GF02-14RG
See R167 (two in parallel for safety)

R169 390Ω 5% 0·25W, R3390-GF02-14RG
Chroma delay line impedance matching

R170 2·2kΩ 5% 0·25W, R4220-GF02-14RG
Impedance matching for B-Y and R-Y detectors

R171 270kΩ 5% 0·25W, R6270-GF02-14RG
PAL switch ident gating/pedestal clamp network with C162 and C163

R172† 820Ω 5% 0·16W, R3820-GF01-43RG

R172*** 3·9kΩ 5% 0·25W, R4390-GF02-14RG
Field blanking pulse feed

R173 1·5kΩ 5% 0·25W, R4150-GF02-14RG
VCO phase shift network, with C154 and C155

R175 27kΩ 5% 0·25W, R5270-GF02-14RG
APC balanced current feed, with R177 C157 and C159

R176 1kΩ 5% 0·25W, R4100-GF02-14RG
4·43MHz osc. frequency damping

R177 27kΩ 5% 0·25W, R5270-GF02-14RG
See R175

R178 2·2kΩ 5% 0·25W, R4220-GF02-14RG
4·43MHz filter, with C158

R181 2·2kΩ 5% 0·25W, R4220-GF02-14RG
TR120 base input impedance matching, and de-emphasis with R182, C166

R182 2·2kΩ 5% 0·25W, R4220-GF02-14RG
See R181

R183 1MΩ 5% 0·25W, R7100-GF02-14RG
95V reference feed to sound output

R184 56kΩ 5% 0·25W, R5560-GF02-14RG
Audio feedback to TR120 base

R185 390Ω 5% 0·25W, R3390-GF02-14RG
TR120 collector load with series active bias transistors TR121 and TR124

R186 6·2kΩ 5% 0·25W, R4620-GF02-14RG
TR104 base bias with safety resistors R187, R198 and R199

R187 6·2kΩ 5% 0·25W, R4620-GF02-14RG
See R186

R188*** 120Ω 5% 0·25W, R3120-GF02-14RG
Earphone sound level adjustment

R190 4·7Ω 5% 0·25W, R1470-GF02-14RG
Field current sampling resistor

R191† 10kΩ 5% 0·25W, R5100-GF02-17RG

R191*** 22kΩ 5% 0·25W, R5220-GF02-01RG
See R172

R192† 26·7kΩ 1% 0·25W, R5267-BM02-16RG

R192*** 27kΩ 5% 0·25W, R5270-GF02-14RG
Part field output feedback pot. divider, with R194

R193 1kΩ 5% 0·25W, R4100-GF02-14RG
TR105 base feed

R194† 200kΩ 1% 0·25W, R6200-BM02-16RG

R194*** 270kΩ 5% 0·25W, R6270-GF02-14RG
See R192

R195 4·7kΩ 5% 0·25W, R4470-GF02-14RG
High pass filter for field scan coils

R198 6·2kΩ 5% 0·25W, R4620-GF02-14RG
See R186

R199 6·2kΩ 5% 0·25W, R4620-GF02-14RG
See R186

⚠R200*** 390Ω 5% 0·25W, Fusible, R3390-GXP2-ES47
Quiescent current limiting, field output

R201 82Ω 5% 0·25W, R2820-GF02-14RG
Part height adjustment with RV202

R203† 10Ω 5% 0·25W, R2100-GF02-01RG

⚠R203*** 33Ω 5% 0·25W, Fusible, R2330-GXP2-ES47
Quiescent current limiting, field output

R204†† 6·2kΩ 5% 0·5W, R4620-GF05-04RG
Tuning voltage supply with R238 and R239

R206*** 270Ω 5% 0·25W, R3270-GF02-15RG
TR107 base bias, with R207, R211 and R212

R207*** 270Ω 5% 0·25W, R3270-GF02-15RG
See R206

R208*** 47kΩ 5% 0·25W, R5470-GF02-14RG
TR108 base bias, with R209, R210 and R221

R209*** 47kΩ 5% 0·25W, R5470-GF02-14RG
See R208

R210*** 47kΩ 5% 0·25W, R5470-GF02-14RG
See R208

R211*** 270Ω 5% 0·25W, R3270-GF02-15RG
See R206

R212*** 270Ω 5% 0·25W, R3270-GF02-15RG
See R206

R213† 68kΩ 5% 0·16W, R5680-GF01-43RG

R213*** 51kΩ 5% 0·25W, R5510-GF02-14RG
TR109 emitter potential divider, with R214 and R216

R214 82kΩ 5% 0·25W, R5820-GF02-14RG
See R213

R215 470Ω 5% 0·25W, R3470-GF02-14RG
TR113 base bias feed

R216 10kΩ 5% 0·25W, R5100-GF02-14RG
See R213

R217 390Ω 5% 0·25W, R3390-GF02-01RG
TR110 collector load with R218 and TR109·TR113 base levels

R218 1kΩ 5% 0·25W, R4100-GF02-14RG
See R217

R219 1kΩ 5% 0·25W, R4100-GF02-14RG
TR111 collector load

R220 10kΩ 5% 0·25W, R5100-GF02-14RG
Line pulse integrator feed to TR108 base

R221*** 47kΩ 5% 0·25W, R5470-GF02-14RG
See R208 and R209

R222† 10kΩ 5% 0·5W, R5100-GF05-04RG
R222*** 10kΩ 5% 0·25W, R5100-GF02-15RG
Line pulse integrator with C186
R223 1·2kΩ 5% 0·25W, R4120-GF02-14RG
TR111 base biasing with RV224, R225 and R229
R225 33kΩ 5% 0·25W, R5330-GF02-14RG
See R223
R226 18kΩ 5% 0·25W, R5180-GF02-14RG
Set HT feedback compensation, with C187 and C188
R227 1·5kΩ 5% 0·25W, R4150-GF02-14RG
Line oscillates feed resistor to TR113 base (line driver)
R228 1·5kΩ 5% 0·25W, R4150-GF02-14RG
T103 primary damping (line driver transformer)
R229 39kΩ 5% 0·25W, R5390-GF02-14RG
See R223
R230 33Ω 5% 0·25W, R2330-GF02-14RG
T103 secondary tap damping
R231† 110kΩ 1% 0·25W, R6110-BM02-16RG
R231*** 150kΩ 1% 0·25W, (metal film), R6150-BM02-16RG
Set Beam limiter level bleed resistor with R232
R232† 8·2kΩ 5% 0·5W, R4820-GF05-04RG
R232*** 9·1kΩ 5% 0·5W, R4910-GF05-04RG
See R231
R233 470kΩ 5% 0·25W, R6470-GF02-14RG
Beam limiter feed from R231, R232 to TR114 base
R234 22kΩ 5% 0·25W, R5220-GF02-14RG
Contrast circuit feed from beam limiter
R235 27kΩ 5% 0·25W, R5270-GF02-14RG
Brightness control circuit feed from beam limiter
R236 33kΩ 5% 0·25W, R5330-GF02-14RG
Line pulse gating feed, with R241, to IC102 via C197
R237 47kΩ 5% 0·25W, R5470-GF02-14RG
Line pulse blanking feed resistor, with R240, to IC103 via C198
R238†† 2·7kΩ 5% 0·25W, R4270-GF02-15RG
See R204
R239†† 2·7kΩ 5% 0·25W, R4270-GF02-15RG
See R204
R240 47kΩ 5% 0·25W, R5470-GF02-14RG
See R237
R241 33kΩ 5% 0·25W, R5330-GF02-14RG
See R236
R245 100kΩ 5% 0·25W, R6100-GF02-14RG
IC102 pin 23 line oscillator soft-start time-constant, with C192
R246 47kΩ 5% 0·16W, R5470-GF01-43RG
Part base feed of overvoltage trip circuit (TR110)
R247 100Ω 5% 0·25W, R3100-GF02-14RG
R.C. volume feed decoupling, with C123
R248*** 120Ω 5% 0·25W, R3120-GF02-14RG
Earphone level setting, with R188
R249 221kΩ 1% 0·25W, R6221-BM02-16RG
Line scan amplitude correction feed to 95V regulator
R250 10kΩ 5% 0·25W, R5100-GF02-14RG
TR126 emitter resistor
R251 2·2kΩ 5% 0·25W, R4220-GF02-14RG
TR126 base bias resistor
R254† 27·4kΩ 1% 0·25W, R5274-BM02-16RG
Part filter network to reduce unwanted signals, with C207
R255† 4·7Ω 5% 0·25W, R1470-GM02-W102
Current limiter resistor
R260† 2·2kΩ 5% 0·25W, R4220-GF02-15RG
Part of selected emitter decoupling, with C208
R266† 1·1kΩ 5% 4W, R4100-GW04-21RG
TR107 base bias resistor
R267† 12kΩ 5% 1W, R5120-GX01-W070
Part base bias resistor (TR108)
⚠R268† 22Ω 5% 0·25W fusible, R2220-GM02-W097
TR104 flashover protection

VARIABLE RESISTORS

RV113 10kΩ rotary, 00E1-127-510-1PG
Volume control
RV129 4·7kΩ lin. 10mm hor. preset pot., 00E1-131-447-PH1
Line hold adjustment
RV133 10kΩ rotary, 00E1-127-510-1PG
Brightness control
RV141 4·7kΩ lin. 10mm hor. preset pot., 00E1-131-447-PH1
Preset Brightness adjustment
RV147 10kΩ rotary, 00E1-127-510-1PG
Contrast control
RV150 10kΩ rotary, 00E1-127-510-1PG
Colour control
RV166 2·2kΩ lin. 10mm hor. preset pot., 00E1-131-422-PH1
Gain adjustment for Delay line amp
RV174 100kΩ preset pot., 00E1-137-610-PH1
Frame hold control
RV179 4·7kΩ lin. 10mm hor. preset pot., 00E1-131-447-PH1
APC potentiometer
RV180 1kΩ lin. 10mm hor. preset pot., 00E1-131-410-PH1
Burst phase adjustment
RV202 100Ω lin. 10mm vert. preset pot., 00E1-095-310-PH2
Height adjustment
RV224 470Ω lin. 10mm hor. preset pot., 00E1-131-347-PH1
Set HT (95V rail)
— Focus potentiometer, part of LOPT
— A1 potentiometer, part of LOPT

CAPACITORS

C100 2·2pF ±0·5pF 50V, C1220-HH250-MAP4
Sound stability (IC102, pin 8)
C101* 470nF 20% 63V, C6470-WW263-24CG
C101†† 100nF 20% 63V, C6100-WW263-24CG
Tuning voltage decoupling
C102 4·7µF 20% 50V Elec., CE147-MS250-23CG
AFC adjacent channel anti-lockout
C103 4·7µF 20% 50V Elec., CE147-MS250-23CG
AFC time constant
C104 18pF 5% 50V Elec., C2180-GG250-MAP4
IF preamp input coupling
C105 39pF 5% 50V, C2390-GG250-MAP5
Bottom end coupling
C106 10nF +80% −20% 50V, C5100-EW250-MAQ3
IF preamp input coupling
C107 1µF 20% 50V Elec., CE110-MS250-23CG
RF AGC potential divider decoupling
C108 4·7µF 20% 50V Elec., CE147-MS250-23CG
AGC decoupling for IC101
C109 10nF +80% −20% 50V, C5100-EW250-MAQ3
12V HF decoupling between IC101 and IC102
C110 22nF 10% 63V, C5220-SS263-24CG
Line flyback integration with R106
C111 10nF +80% −20% 50V, C5100-EW250-MAQ3
Impedance matching, SF101 output, with R110
C112 220nF 5% 63V, C6220-GG263-24CG
IC102 pin 1, field osc. external tuning, with R116 and RV174
C113 390pF 5% 630V, C3390-GG263-RBG9
6MHz quadrature coil (L104) tuning, with R112
C114 10nF +80% −20% 50V, C5100-EW250-MAQ3
IC102 pin 13 d.c. blocking and 6MHz coupling
C115 100nF +80% −20% 16V, C6100-EW216-MAQ6
IC102 pin 14 HF decoupling
C116 10nF +80% −20% 50V, C5100-EW250-MAQ3
Flashover immunity capacitor
C117 470µF 20% 16V Elec., CE347-MS216-21CG
12V line decoupling, to IC102
C118 330pF 5% 50V, C3330-GG250-MAT1
Part of intercarrier rejector, with L106, C119 and R123
C119 330pF 5% 50V, C3330-GG250-MAT1
See C118
C120 1nF 10% 50V, C4100-SS250-MAP2
Intercarrier sound coupling to IC102 pin 15
C121 10nF +80% −20% 50V, C5100-EW250-MAQ3
IF amplifier HF decoupling, IC102 pin 18
C122 100pF — Part of L105 can assembly
Vision carrier coil tuning
C123 10nF +80% −20% 50V, C5100-EW250-MAQ3
R.C. volume feed decoupling, with R247
C124 2·7nF 5% 160V, C4270-GG316-RGB9
Line osc. external tuning, with R128 and RV129 (IC102 pin 23)
C125 68nF 10% 63V, C5680-SS263-24CG
Part line osc. external loop filter with C130 and R131, IC102 pin 25 (flywheel sync storage)
C126 22pF 5% 50V, C2220-GG250-MAP4
Part chroma bandpass circuit, with C128, L109, R151 and R157
C127 4·7µF 20% 50V Elec., CE147-MS250-23CG
Part AGC gating external time-constant with R140
C128 68pF 5% 50V, C2680-GG250-MAP7
See C126
C129 68nF 10% 63V, C5680-SS263-24CG
Sync separator clipper time-constant, with R130 and R139
C130 2·2µF 20% 50V Elec., CE122-MS250-23CG
See C125
C131 220nF 5% 63V, C6220-GG263-24CG
Coincidence detector time-constant, with R132
C132 10µF 20% 50V Elec., CE210-MS250-23CG
IC103 pin 4 decoupling (brightness circuit)
C133† 470µF 20% 16V Elec., CE347-MS216-26CG
C133*** 47µF 20% 16V Elec., CE247-MS216-23CG
12V supply decoupling with R144, to IC102
C134 100nF +80% −20% 16V, C6100-EW216-MAQ6
12V supply HF decoupling
C135 4·7µF 20% 50V Elec., CE147-MS250-23CG
Pedestal clamp and video amplifier decoupling, IC103 pin 3
C136 10µF 20% 50V Elec., CE210-MS250-23CG
Luma input d.c. blocking to IC103 pin 5
C137 10pF 5% 50V, C2100-GG250-MAP4
Video amplifier frequency compensation, IC103 pin 6
C138 1µF 20% 50V Elec., CE110-MS250-23CG
Contrast control decoupling, IC103 pin 7
C139 1µF 20% 50V Elec., CE110-MS250-23CG
Colour control decoupling, IC103 pin 8
C140 10nF +80% −20% 50V, C5100-EW250-MAQ3
IC103 pin 10 decoupling (chroma amp)
C141 10nF +80% −20% 50V, C5100-EW250-MAQ3
Chroma coupling and d.c. blocking to ACC amp (IC103, pin 11)
C142 1µF 20% 50V Elec., CE110-MS250-23CG
ACC time-constant, with R153
C143 470nF 20% 50V Elec., CE047-MS250-23CG
Killer bias decoupling, IC103 pin 13
C149 22pF — Part of L105 can assembly
Vision carrier coil tuning
C150 10nF +80% −20% 50V, C5100-EW250-MAQ3
Part of chroma delay line matrix drive circuit
C151 39pF 5% 50V, C2390-GG250-MAP5
Broad bandpass filter, with L111
C152 10nF +80% −20% 50V, C5100-EW250-MAQ3
Delay line amplifier amplitude control coupling to emitter TR102
C153† 100µF 20% 50V Elec., CE310-MS250-26CG
18V line decoupling (sound output)
C154 18pF 5% 50V, C2180-GG250-MAP4
Phase shift control, with R173, C155
C155 100pF 5% 50V, C3100-GG250-MAP7
VCO phase shift, with C154 and R173
C156 47pF 5% 50V, C2470-GG250-MAP6
4·43MHz oscillator frequency correction
C157 22nF +80% −20% 50V, C5220-EW250-23CG
APC balance current feed, with R175, R177 and C159
C158 4·7µF 20% 50V Elec., CE147-MS250-23CG
4·43MHz filter, with R178
C159 22nF +80% −20% 50V, C5220-EW250-MAQ4
See C157
C160 100pF 5% 50V, C3100-GG250-MAP7
Part of burst phase adjustment network, with C161 and L110
C161 47pF 5% 50V, C2470-GG250-MAP6
See C160
C162 1nF 10% 500V, C4100-SS350-MAQ1
See R171
C163 3·9nF 10% 500V, C4390-SS350-MAQ2
See R171
C165 47µF 20% 16V Elec., CE247-MS216-23CG
Audio amp coupling from IC102
C166 100nF 20% 63V, C6100-WW263-24CG
Part de-emphasis network, with R181 and R182
C167 100nF +80% −20% 16V, C6100-EW216-MAQ6
Audio output frequency compensation
C169*** 100µF 20% 25V Elec., CE310-MS225-23CG
C169† 330µF 20% 25V Elec., CE333-MS225-26CG
Loudspeaker coupling

C170†† 10nF +80% −20% 50V, C5100-EW250-MAQ3
Tuning voltage HF decoupling
C171 47µF 100V Elec., CE247-MS310-RYD3
Field scan a.c. coupling
C172† 6·8µF 20% 50V Elec., CE168-MS250-23CG
C172***4·7µF 20% 50V Elec., CE147-MS250-23CG
Field output stage a.c. feedback coupling
C174 1µF 20% 50V Elec., CE110-MS250-RYK5
AF coupling (audio out from IC102 pin 12)
C175 100pF 10% 500V, C3100-SS350-MAQ9
Prevents peak sound modulating the field scan
C176 10µF 20% 50V Elec., CE210-MS250-23CG
Decoupling input to IC105 (12V regulator)
C177* 100nF +80% −20% 25V, C6100-EW225-14CG
IC105 transient protection
C178 100pF 5% 50V, C3100-GG250-MAP7
70V line decoupling (TR108 emitter)
C179 100nF 20% 250V, C6100-WW325-05CG
D120 transient protection
C180 100nF 20% 250V, C6100-WW325-05CG
D123 transient protection
C181 2200µF 35V Elec., CE422-MS235-RYG9
Reservoir for 18V rail (unstabilized)
C182† 330µF 20% 16V Elec., CE333-MS216-26CG
C182***10µF 20% 50V Elec., CE210-MS250-23CG
Smoothing capacitor for 12V regulator
C183 1000µF 120V Elec., CE410-MS312-MU62
Reservoir for 85V rail (unstabilized)
C184 100pF 5% 50V, C3100-GG250-MAP7
TR113 stabilizing
C185 1nF 10% 500V, C4100-SS350-MAQ1
D109 transient protection
C186 2·7nF 5% 160V, C4270-GG316-RBG9
Line pulse integrator, with R222
C187 3·9nF 10% 500V, C4390-SS350-MAQ2
Set HT feedback compensation, with R226 and C188
C188 1nF 10% 50V, C4100-SS250-MAP2
See C187
C189 22µF 20% 50V Elec., CE222-MS250-23CG
Boost reservoir (95V rail)
C190† 22µF 200V Elec., CE222-MS320-RYB3
C190***22µF 160V Elec., CE222-MS316-RYF4
D115 reservoir (150V rail)
C191 22µF 160V Elec., CE222-MS316-RYF4
95V rail smoothing
C192 1µF 20% 50V Elec., CE110-MS250-23CG
IC102 pin 23 line oscillator soft start time-constant, with R245
⚠C193 330nF 10% 400V, C6300-SS340-RBD2
'S' correction
C194† 5·6nF 5% 1·5kV Poly, C4560-CG415-RBF7
⚠C194***6·8nF 5% 1·5kV, C4680-GG415-RBF7
Line tuning capacitor
C195 100nF 20% 250V, C6100-WW325-05CG
Beam limiter decoupling
C196 47µF 20% 16V Elec., CE247-MS216-23CG
Provides appropriate decay time of beam limiter action
C197 100nF 20% 250V, C6100-WW325-05CG
Line pulse coupling, with R236
C198 10nF 10% 400V, C5100-SS340-04CG
Line blanking pulse coupling
C199 470nF 20% 63V Met Poly, C6470-WW263-24CG
Base decoupling
C200 68pF 5% 50V, C2680-GG250-MAP7
FL101 input coupling (was R122)
C205 470nF 20% 63V, C6470-WW263-24CG
'Spook' suppression
C207† 1µF 20% 50V Elec., CE110-MS250-26CG
See R254
C208† 150pF 5% 50V Cer., C3150-CG250-MAQ5
Selected video high frequency peak, with R260
C211† 22µF 10% 100V, C5220-SS310-24CG
Interference decoupling from line drive

TRANSISTORS

TR100* BC307B, 00TR-004-403-1TG
AFC defeat switch
TR101 BC238C, 00TR-002-404-1TG
Video invertor amplifier
TR102 BC307B, 00TR-004-403-1TG
Chroma delay line amp
TR104***T1P29E, 01V0-969
TR104† T9065V, 01V0-985
Field output with TR105
TR105 T1P112H, 01V0-968
See TR104
TR107 BD839, 08V1-399
Chopper switch for 95V rail regulation
TR108 BC338C, 00TR-008-404-1TG
Current summing amplifier and chopper switch driver
TR109 BC307B, 00TR-004-403-1TG
Overvoltage trip, with TR110 (150V rail)
TR110 BC238B, 00TR-002-403-1TG
See TR109
TR111 BC307B, 00TR-004-403-1TG
Error amp for 95V regulator
TR112*** T9064V, 01V0-970
TR112† T6076V, 01V0-995
Line output
TR113 BC327A, 00TR-010-402-1TG
Line driver
TR114 BC307B, 00TR-004-403-1TG
Beam current limiter
TR120 BC307C, 00TR-004-404-1TG
Audio preamplifier
TR121 BC307C, 00TR-004-404-1TG
Active bias transistor for audio output transistor TR124 (prevents crossover distortion)
TR123 BD385, 08V1-398
Part audio output amplifier stage
TR124 BC238C, 00TR-002-404-1TG
See TR121
TR125† ZTX550, 00V1-646
TR125*** BC327A, 00TR-010-402-1TG
Part audio output amplifier stage
TR126 ZTX341STZA, 00V1-642
Line scan amplitude - high beam compensation

DIODES

D102 BZX83C4V7, 02V4-176-147
Blanking input clamp diode, IC103 pin 2
D103 BAV20, 00DD-002-001-1DG
Line pulse clipper, pins 19 and 23 of IC103
D106† BZX85C150V, 03V4-197-315
D106 1N4001, 00DP-001-001-1DG
Frame output clamp
D107 1N4001, 00DP-001-001-1DG
Frame 'totem' diode
D109 BYD33G, 00V4-359
95V rail isolating (part chopper switch)
D110 Type 425, 00DD-001-001-1DG
TR108 e-b clamp
D111 BZX83C6V8, 02V4-176-168-200
TR111 emitter reference diode
D112 1N4001, 00DP-001-001-1DG
Offer drive bias for TR107
D113† BY133GP, 03V4-117-200
D113 OF721, 00V4-632
Line scan efficiency diode
D114 BYD33G, 00V4-359
Boost diode, 95V supply
D115 BYD33G, 00V4-359
150V supply boost diode
D116 1N4004GP, 00DD-004-001-1DG
Beam limiter reference diode
D117 BAV20, 00DD-002-001-1DG
Field blanking clamp/frame d.c. shift
D118 BZX83C4V7, 02V4-176-147
Line pulse gating clamp diode, IC103 pins 19 and 23
D119†† MVS460-2, 00V3-327
Tuning voltage regulator (32V)
D120 BY133GP, 03V4-117-200
Rectifier for 85V unstabilized supply with D123
D121 BY133GP, 03V4-117-200
Rectifier for 18V unstabilized supply with D122
D122 BY133GP, 03V4-117-200
See D121
D123 BY133GP, 03V4-117-200
See D120
D124 1N4004GP, 00DP-004-001-1DG
On/off switch monitoring diode for battery adaptor
D125† RGP15-14, 02V4-753
D125***RGP10M, 01V4-786
Anti-saturation for line output transistor
D127* Type 425, 00DD-001-001-1DG
Isolation diode (Tune-down line)
D128* Type 425, 00DD-001-001-1DG
Isolation diode (Memory line)
D133* BZX83C5V6, 02V4-176-156-200
AFC defeat reference diode
D134 Type 425, 00DD-001-001-1DG
Time constant discharge diode (TR110 collector)
D135 †1N4448, 01V4-581-200
Constant voltage offset for TR104, with D136
D136† 1N4448, 01V4-581-200
See D135
D137† BZV85C68, 03V4-139-268
Overvoltage protection

INTEGRATED CIRCUITS

IC101 SL1431, 00V3-743
IF preamplifier (SAWF)
IC102 TDA4500, 00V3-638
IF and video detector, quadrature sound det., field and line processor
IC103 UPC1365C, 00V3-480
Luminance, chrominance and video processing
IC105 UPC7812H, 00IC-017-901-0IG
12V regulator

INDUCTORS

L103 Preamp input coil, 90D0-163-003-TK1
Part of IF preamp input tuned circuit, with C104 and C106
L104 Sound quadrature coil, 90D0-202-003-TK1
Part of sound demodulator tank circuit
L105 Vision carrier coil, 90D0-203-003-TK1
Part of vision synchronous detector
L106 Intercarrier rejector coil, 90D0-198-003-TK1
Intercarrier sound trap (prevents sound on vision)
L109 Chroma filter, 00D0-915-003-TK1
Part of chroma bandpass network
L110 33µH 10% radial lead, L2330-SR000-TD06
Burst phase adjustment coil, with RV180, C160 and C161
L111 Post chroma delay line coil, 00D0-911-003-TK1
Part of delay line matrix for feeding R-Y and B-Y to appropriate synchronous detectors
L113 Pre-chroma delay line coil, 00D0-914-003-TK1
Chroma delay line input coil
L114 6·8µH 10% radial lead, L1680-SR000-TD06
Prevents half IF radiation from entering luma stages
L115 15µH 10% radial lead, L2150-SR000-TD06
Couples d.c. and blocks a.c.
L120 P.S.U. inductor, 90D4-104-001-01G
Energy storage choke, 85V line
⚠T101*** Mains transformer, 90D3-038-001
⚠T101†† Mains transformer, 90D3-041-001
⚠T101** Mains transformer, 90D3-042-001
Mains isolating (cabinet mounted)
⚠T102† Diode split transformer, 00D4-247-001-HT1
⚠T102*** Diode split transformer, 00D4-235-002-HT1
Line output transformer, and EHT rectifier combined
T103† Line driver transformer, 90D4-112-001-01G
T103*** Line driver transformer, 90D4-105-002
Provides coupling between TR113 and TR112

MISCELLANEOUS

DL107 Luminance delay line, 01E5-010-001-TD2
Includes subcarrier trap
DL112 Chroma delay line, 00E5-931-001-01G
64µs delay for PAL system
FL101 6·0MHz ceramic filter, 00E5-992-MA4
Intercarrier sound selectivity
⚠FS101** Fuse T1·6A time lag, 00E6-041-160-01G
⚠FS101 Fuse T1A time lag, 00E6-041-100-01G
Mains transformer primary fuse
⚠FS102** Fuse T2A time lag, 00E6-041-200-01G
⚠FS102 Fuse T1·6A time lag, 00E6-041-160-01G
Mains transformer secondary fuse
SK101*** Earphone socket, 00F6-377-001
Mutes internal speaker, when used
SF101 SY153A, 00V3-639
IF surface acoustic wave filter
S101*** Push-Push switch, 00E2-158-001
On/off switch
XL101 Crystal 4·43MHz, 00E5-930-001-KK1
Reconstitutes chroma subcarrier from the burst signal
Z101 VDR P15·2/1R, 00E5-146-PD1
Sets the AFC range, with R101 and R102
Z102 VDR Dual PTC 120V PTH451C, 00E5-168-001-MA1
Provides degauss cycle

CRT Base Panel

Model 14C2, PC1141-001
PCB Assembly, 01V6-141-001
Models 16A1 and 16A2, PC1141-004
PCB Assembly, 01V6-141-004

RESISTORS

R602, R605, R630 27kΩ 5% 0·5W, R5270-GF05-04RG
TR601 collector load

R603, R604, R606 27kΩ 5% 0·5W, R5270-GF05-04RG
TR602 collector load

R607, R628, R629 27kΩ 5% 0·5W, R5270-GF05-04RG
TR603 collector load

R608† 3Ω 10% 1·2W, R1300-ST01-CG12

R608*** 1·8Ω 10% 1·2W, R1180-ST01-CG12
CRT heater dropper

R609 2·7kΩ 10% 0·5W, R4270-SC05-10RG
Green gun flashover protection

R610 220Ω 5% 0·25W, R3220-GF02-01RG
TR601 base feed

R611 220Ω 5% 0·25W, R3220-GF02-01RG
TR602 base feed

R612 220Ω 5% 0·25W, R3220-GF02-01RG
TR603 base feed

R613 2·7kΩ 10% 0·5W, R4270-SC05-10RG
Blue gun flashover protection

R614 2·7kΩ 10% 0·5W, R4270-SC05-10RG
Red gun flashover protection

R615 390Ω 5% 0·25W, R3390-GF02-17RG

R615† 330Ω 5% 0·25W, R3330-GF02-17RG
TR601 frequency compensation

R616 390Ω 5% 0·25W, R3390-GF02-17RG

R616† 330Ω 5% 0·25W, R3330-GF02-17RG
TR602 frequency compensation

R617 390Ω 5% 0·25W, R3390-GF02-17RG

R617† 330Ω 5% 0·25W, R3330-GF02-17RG
TR603 frequency compensation

R621 1·8kΩ 5% 0·25W, R4180-GF02-17RG

R621† 1·5kΩ 5% 0·25W, R4150-GF02-17RG
Green background setting, with RV624

R622 1·8kΩ 5% 0·25W, R4180-GF02-17RG

R622† 1·5kΩ 5% 0·25W, R4150-GF02-17RG
Blue background setting, with RV625

R623 1·8kΩ 5% 0·25W, R4180-GF02-17RG

R623† 1·5kΩ 5% 0·25W, R4150-GF02-17RG
Red background setting, with RV626

R627 100kΩ 5% 1W, R6100-GM10-MU20
A1 flashover protection

VARIABLE RESISTORS

RV624-RV626 10kΩ lin. 10mm hor. preset pot., 00E1-131-510-PH1
Green, blue and red background adjustments

CAPACITORS

C602 270pF 5% 50V, C3270-GG250-MAR1
Frequency compensation, TR601

C603 270pF 5% 50V, C3270-GG250-MAR1
Frequency compensation, TR602

C604 270pF 5% 50V, C3270-GG250-MAR1
Frequency compensation, TR603

C605 10nF +80% −20% 2kV ceramic disc, C5100-EW420-MAK8
A1 decoupling

TRANSISTORS

TR601-3 BF460, 09V1-329
Video output transistors

MISCELLANEOUS

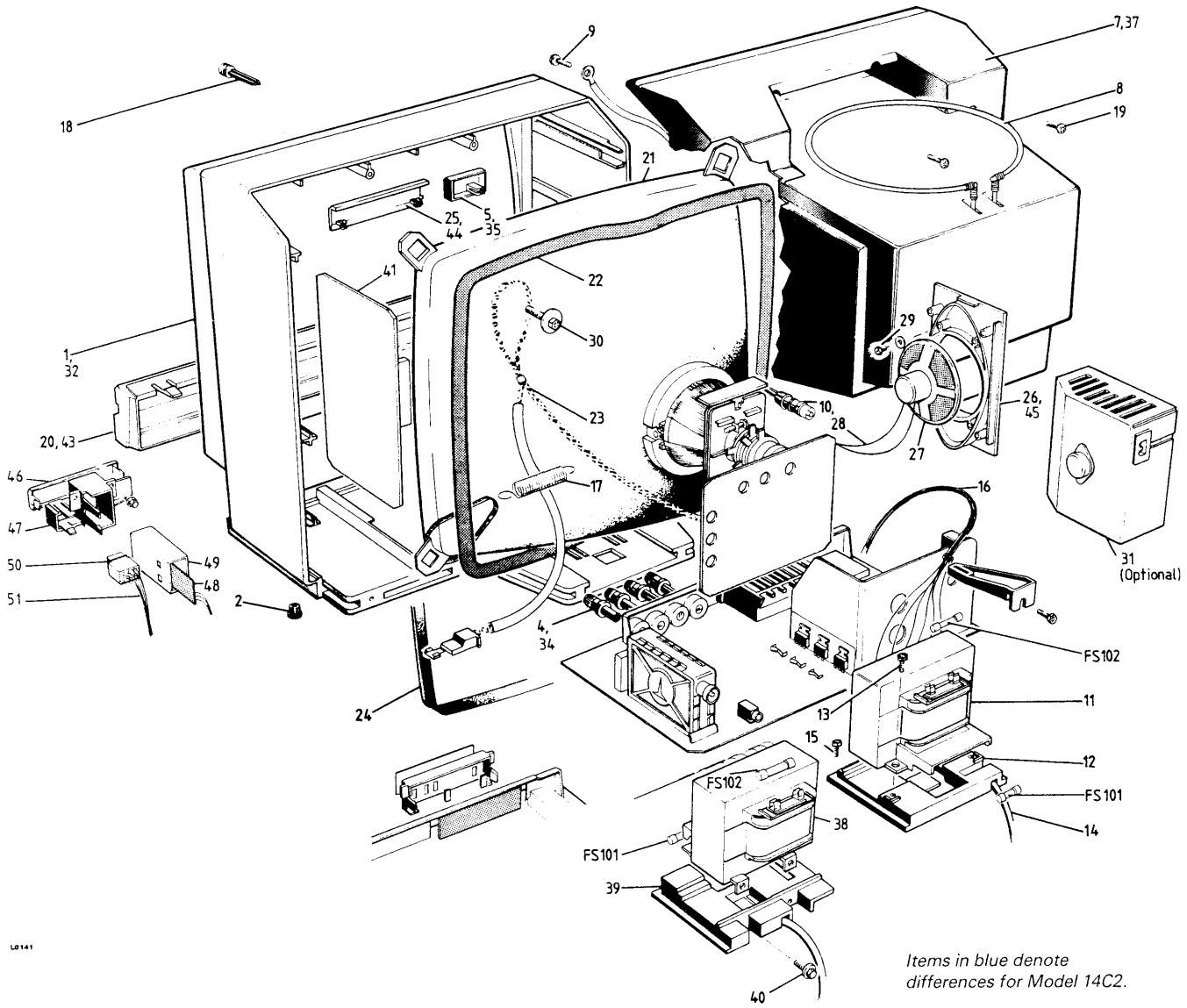
SG601-5 Spark gaps, Part of minineck CRT holder, 00F6-386-001
CRT cathodes, A1 and focus flashover protection

MODIFICATIONS IN PRODUCTION (PC1130)

The following modifications are in addition to those listed on page A11 of Section A.

Reference	Early Chassis	Later Chassis	Remarks
C175	not fitted	100pF	Between base & collector of TR105. Prevents peak sound modulating the field scan.
R138	180kΩ	120kΩ	To ensure AV operation on Channel 8.
R195	2·2kΩ	4·7kΩ	To exclude teletext lines at top of picture (C175 must be fitted).
C100	6·8pF	2·2pF	To reduce patterning under weak signal conditions.
C176	not fitted	10μF	At input to 12V regulator. To prevent oscillation in 12V regulator.
R178	1kΩ	2·2kΩ	Improved colour lock
D113	IN4007GP	0F721	To protect line output transistor, from high voltage transients.
R229	39kΩ	33kΩ	To ensure HT control (RV224) stays in range.
D120 —D123	BY127 or BY133GP	BYD33G	Avalanche type introduced to reduce possibility of failure from static/flashover.

CABINET AND GENERAL ITEMS (14C1 and 14C2)



Items in blue denote differences for Model 14C2.

When ordering replacements, quote model number, 'G' number or component reference, description and part number.

Please note that some of the 'G' number references identified on the exploded illustration apply to PCB assemblies. Their details are listed under the Component Details on page G3.

G1 Cabinet, grey (includes G2), 90M7-074-06A
G1a Cabinet, bianco (includes G2), 90M7-074-06K
G1b Cabinet, white (includes G2), 90M7-074-065
G2 Foot, 90A8-014-001
G3 TX952-2 Chassis assembly, 02M4-003-001
G4 Control knob, grey, 90C0-060-003
G4a Control knob, bianco, 90C0-060-005
G4b Control knob, white, 90C0-060-002
G5 On/off knob, grey, 90C0-061-003
G5a On/off knob, bianco, 90C0-061-005
G5b On/off knob, white, 90C0-061-002
G7 Cabinet back assembly, black (includes G8 to G10), 90M4-590-001
G7a Cabinet back assembly, sienna (includes G8 to G10), 90M4-590-004
G8 Loop aerial, 06F0-015-005-01G
G9 Screw No. 6 × ½" SEMS hex. (G8 to G7, G7a, G37a, G37b and G37c), 00L6-035-008
G10 Aerial socket and lead assembly, 90G2-007-002
G11 Mains transformer, 90D3-035-003
G12 Transformer mounting, 90C8-307-001
G13 Screw No. 6 × ⅜" hex. (G11 to G12), SY06-HP06
G14 Mains lead, 06H1-012-009
G15 Screw No. 6 × ½" Pozidriv hex. (G11 to G12), SY06-HP08
G16 Mains transformer lead assembly, 06G0-088-001
G17 Spring, 90B5-018-001
G18 Tuning adjustment knob (14C1 only), 00C0-595-001
G19 Screw No. 6 × ½" Pozidriv (G7, G7a, G37a, G37b and G37c to G1, G1a, G1b, G32, G32a and G32b), SY06-TP08-D
G20 Control panel, grey, 90A4-177-001
G20a Control panel, bianco, 90A4-177-005
G20b Control panel, white, 90A4-177-008
G21 14 inch colour CRT 90° (AXM37-001), 00V9-739-001-01G
G22 Degauss coil assembly, 90D0-199-001
G23 Braided crimped lead assembly, 90G4-063-002-01G
G24 Tube aperture trim, 06A2-056-002
G25 Control flap, grey, 90A4-181-001
G25a Control flap, bianco, 90A4-181-005
G25b Control flap, white, 90A4-181-004
G26 Speaker baffle, grey, 90C8-339-003
G26a Speaker baffle, bianco, 90C8-339-005
G26b Speaker baffle, white, 90C8-339-002
G27 16Ω Loudspeaker, 06E3-027-001
G28 Loudspeaker lead assembly, 90G0-175-001
G29 Screw No. 8 × 10mm with captive washer (G27 to G26, G26a, G26b and G45), 00L6-235-110
G30 Screw No. 10 × ⅝" SEMS hex. (G21 to G1, G1a, G1b, G32, G32a and G32b), 00L6-493-010
– Instruction book (14C1), 90P1-175-003

Optional Extra

G31 TA127B Battery adaptor kit, 00X2-700-127-B00

Differences for model 14C2

G32 Cabinet, red (includes G2), 90M7-075-06R
G32a Cabinet, blue (includes G2), 90M7-075-06P
G32b Cabinet, anthracite (includes G2), 90M7-075-06C
G33 TX952-3 Chassis assembly, 02M4-003-003
G34 Control knob, black (for G32, G32a and G32b), 90C0-060-001
G35 On/off knob, black (for G32, G32a and G32b), 90C0-061-001

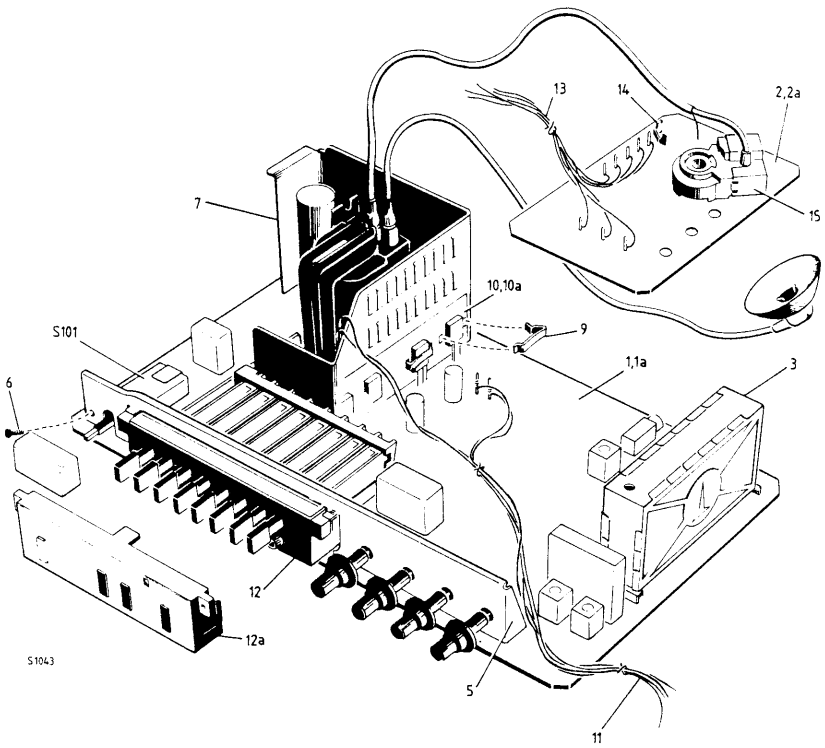
G37a Cabinet back assembly, red (includes G8 to G10), 07M4-025-001
G37b Cabinet back assembly, blue (includes G8 to G10), 07M4-025-002
G37c Cabinet back assembly, anthracite (includes G8 to G10), 07M4-025-003
G38 Mains transformer, 90D3-038-001
G39 Transformer mounting, 90C8-322-002
G40 Screw No. 8 × 13mm (G38 to G39), 00L6-235-113
G41 Remote receiver PCB assembly, 01V6-139-003
G42 Trim, 90A4-165-007
G43 Control panel, grey, 90A4-180-009
G43a Control panel, bianco, 90A4-180-004
G43b Control panel, red, 90A4-180-005
G43c Control panel, blue, 90A4-180-006
G43d Control panel, anthracite, 90A4-180-007
G43e Control panel, white, 90A4-180-008
G44 Control flap, grey, 90C8-341-005
G44a Control flap, bianco, 90C8-341-007
G44b Control flap, red, 90C8-341-008
G44c Control flap, blue, 90C8-341-009
G44d Control flap, anthracite, 90C9-341-006
G44e Control flap, white, 90C8-341-002
G45 Speaker baffle, black, 90C8-339-001
G46 Infra-red window, 90C8-342-001
G47 LED and preamp can holder, 90C8-349-001
G48 Infra-red preamp assembly, 90M4-591-001
G49 Screening can, 00B1-943-002
G50 7 segment LED display, 00V4-355
G51 LED lead assembly, 90G0-197-002
— Instruction book (14C2), 90P1-175-003

CHASSIS REPLACEMENT PARTS (Models 14C1 and 14C2)

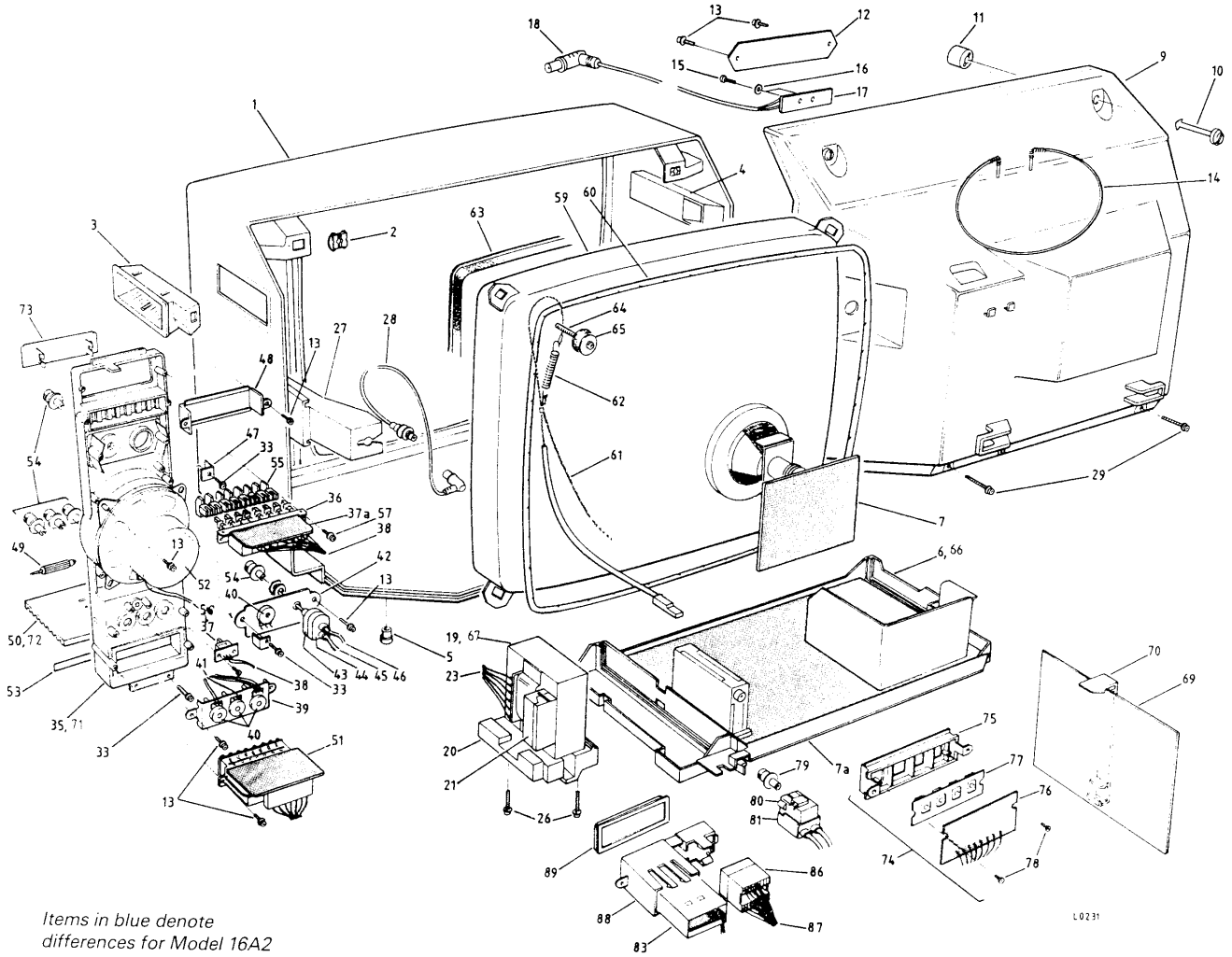
Items in italic apply to model 14C2 only

When ordering replacements quote model number, reference number (with G prefix), description and part number. Items with circuit references (shown in the illustration) are listed under Component Details.

G1 Main PCB assembly (PC1130), 02M4-003-001
G1a *Main PCB assembly (PC1140), 02M4-003-003*
G2 CRT PCB assembly (PC1131), 01V6-131-001
G2a *CRT PCB assembly (PC1141), 01V6-141-001*
G3 UHF varicap tuner, 06M8-020-006
G4 Tuning control & switch bracket assembly, incl. G5, G6, On/Off switch and four potentiometers, 90M4-552-001
G5 Control bracket, 90B1-273-004
G6 Screw securing On/Off switch, SY04-HP05
G7 Heatsink, 90B1-274-005
G9 Transistor clip, 00L4-136-001-01G
G10 Transistor pad, 90B4-111-001
G10a *Transistor pad, 06B4-220-002*
G11 Line & Field scan lead assembly, 90G0-174-002-01G
G12 8-way tuning selector switch assembly, 01M4-515-002
G12a *Channel selector assembly, 90M4-567-001*
G13 Tube base lead assembly, 90G0-173-001
G14 Earth butterfly, 90B1-179-001
G15 CRT holder, 00F6-386-001



CABINET AND GENERAL ITEMS (16A1 and 16A2)



Items in blue denote differences for Model 16A2

When ordering replacements, quote model number, 'G' number or component reference, description and part number.

Please note that some of the 'G' number references identified on the exploded illustration apply to PCB assemblies. Their details are listed under the Component Details on page G3.

G1 Cabinet, grey (includes G2, G3, G4 and G5), 90M7-077-06A
G1a Cabinet, bianco (includes G2, G3a, G4a and G5), 90M7-077-06K
G1b Cabinet, white (includes G2, G3, G4 and G5), 90M7-077-065
G2 Cam, 00C8-574-001
G3 Cabinet handle, black (control side), 90C8-250-001
G3a Cabinet handle, sienna (control side), 90C8-250-002
G4 Cabinet handle, black (tube side), 90C8-252-001
G4a Cabinet handle, sienna (tube side), 90C8-252-003
G5 Foot, 90A8-014-001
G6 TX952-8 Chassis assembly (includes G7 and G7a), 02M4-003-008
G7 CRT PCB and lead assembly, 01V6-141-604
G7a Chassis support, 90C8-344-001
G9 Cabinet back, black, 06A1-116-017
G9a Cabinet back, sienna, 06A1-116-021
G10 Back locking stud, black, 00C8-425-001
G10a Back locking stud, sienna, 00C8-425-003
G11 Back cover latch retainer and spacer, 01C8-021-001
G12 Aerial cover, 06C8-361-001
G13 Screw No. 6 × ⅜" SEMS Pozidriv (G12 to G9, G9a, G39, G42, G47, G48, G51 and G52 to G35 and G35a), 00L6-035-006
G14 Loop aerial, 06F0-015-002-01G
G15 Screw 6BA × ⅜" hex. (G17 to G14), SB06-HH06
G16 Washer for G15, WPL-B06
G17 PCB aerial rivetting assembly, 06M1-132-001
G18 Aerial socket and lead assembly, 06G2-013-007
G19 Mains transformer, 90D3-041-001
G20 Transformer mounting, 90C8-348-001
G21 Fuse cover, 90C8-356-001
G22 Transformer mains lead assembly, 90G0-230-002-01G
G23 Mains transformer lead assembly, 06G0-088-002-01G
G26 Screw No. 6 × ¾" SEMS Pozidriv hex. (G19 to G20; G20 to G1, G1a and G1b), 00L6-035-012
G27 Aerial socket moulding, 06C8-365-001
G28 Aerial lead assembly, 06G2-023-002
G29 Screw No. 8 × 19mm (G9 and G9a to G1, G1a and G1b), 00L6-235-019
G33 Screw No. 6 × ½" SEMS (G42 and G47 to G35 and G35a; G35, G35a, G71 and G71a to G1, G1a and G1b), 00L6-035-008
G35 Control panel, black (for G1 and G1b), 06A4-707-002
G35a Control panel, sienna (for G1a), 06A4-707-003
G36 Channel selector and AFC switch assembly (includes G37, G37a and G38), 90M4-599-001
G37 AFC switch, 00E2-146-001-LS1
G37a Channel select PCB assembly, 01V6-208-001
G38 Channel selector and AFC switch lead assembly, 90G0-225-002-01G
G39 Control mounting bracket, 06B1-419-002
G40 10kΩ lin. rotary pot., (4 used), 00E1-122-510-1PG
G41 Front controls lead assembly, 90G0-216-002-01G
G42 On/off volume mounting bracket, 06B1-420-003
G43 Rotary mains switch, 00E2-191-001-LS1
G44 Mains switch cover, 01C8-325-001
G45 Mains lead, 06H1-012-009
G46 Mains switch lead assembly, 90G0-217-002-01G
G47 R/H support bracket, 06B1-424-001
G48 Presentation panel, 06C8-366-001
G49 Tuning tool (16A1 only), 01C8-080-001
G50 Control flap, black (for G1 and G1b), 06A4-708-003
G50a Control flap, sienna (for G1a), 06A4-708-005
G51 8-channel tuning unit PCB assembly, 01V6-207-001
G52 8Ω Loudspeaker, 90E3-008-MU2
G53 Emblem, black (for G1 and G1b), 06A6-059-001
G53a Emblem, sienna (for G1a), 06A6-059-003

G54 Rotary control knob, black (for G1 and G1b), 06C0-233-001
G54a Rotary control knob, sienna (for G1a), 06C0-233-003
G55 Push button, 06C0-248-001
G56 Loudspeaker lead assembly, 90G0-224-001-01G
G57 Screw No. 4 × ⅜" (G36 to G35 and G35a), SY04-HP06
G59 16 inch colour CRT 90° (A38EAC50X04), 00V9-773-001-01G
G60 Degauss coil and lead assembly, 00D0-928-003
G61 Braided crimped lead assembly, 90G4-069-002-01G
G62 Spring, 90B5-018-001
G63 Tube aperture trim, 06A2-057-003
G64 Screw No. 10 × 1" (G59 to G1, G1a and G1b), SY10-HP16
G65 Washer for G64, 00L6-014-162
— Instruction book (16A1), 90P1-177-002

Differences for Model 16A2

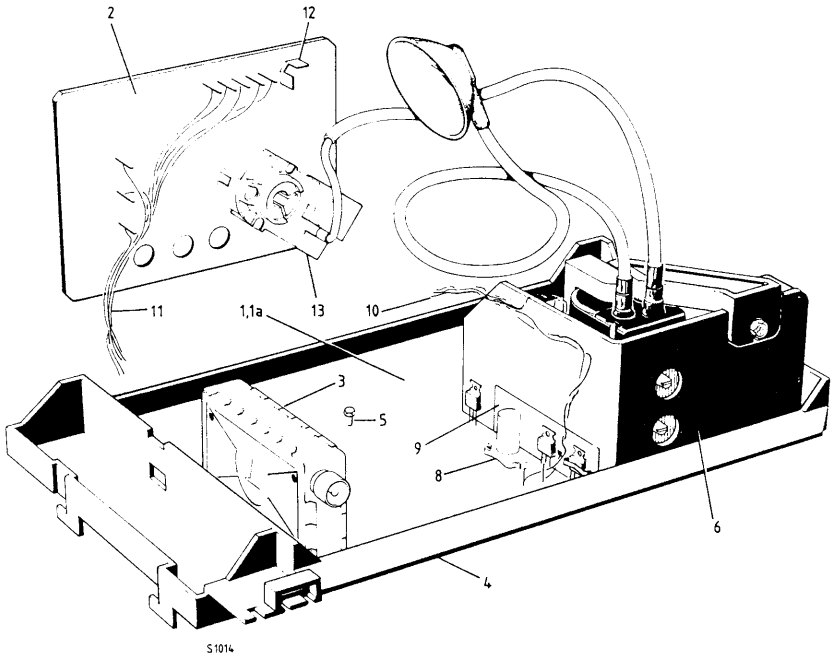
G66 TX952-9 Chassis assembly (includes G7 and G7a), 02M4-003-009
G67 Mains transformer, 90D3-042-001
G69 Remote receiver PCB assembly, 01V6-139-003
G70 PCB retainer, 90C8-345-001
G71 Control panel, black (for G1 and G1b), 90A4-191-001
G71a Control panel, sienna (for G1a), 90A4-191-002
G72 Control flap, black (for G1 and G1b), 90A4-187-001
G72a Control flap, sienna (for G1a), 90A4-187-002
G73 Channel switch adaptor cover, black, 90A4-190-002
G73a Channel switch adaptor cover, sienna, 90A4-190-001
G74 Touch pad assembly, silver, for G1 and G1b (includes G75, G76, G77 and G78), 90M4-607-001
G74a Touch pad assembly, sahara, for G1a (includes G75a, G76, G77a and G78), 90M4-607-002
G75 Contact pad holder, 90C8-362-002
G75a Contact pad holder, 90C8-362-003
G76 Touch pad PCB and lead assembly, 01V6-209-601
G77 Contact pad, 90E2-036-001
G77a Contact pad, 06E2-036-002
G78 Screw No. 4 × $\frac{3}{16}$" Pozidriv (G76 to G75 and G75a), SY04-TP03
G79 On/off knob, black (for G1 and G1b), 90C0-065-001
G79a On/off knob, sienna (for G1a), 90C0-065-002
G80 Mains on/off switch, 00E2-185-002
G81 Mains switch cover, 01C8-335-002
G82 Infra-red preamp assembly (includes G83), 90M4-591-001
G83 Screening can, 00B1-943-002
G86 LED display, 02V4-509
G87 LED lead assembly, 90G0-235-002-01G
G88 Display receiver moulding, 06C8-367-004
G89 Infra-red window, 06A4-709-002
— Instruction book (16A2), 90P1-180-002

CHASSIS REPLACEMENT PARTS (Models 16A1 and 16A2)

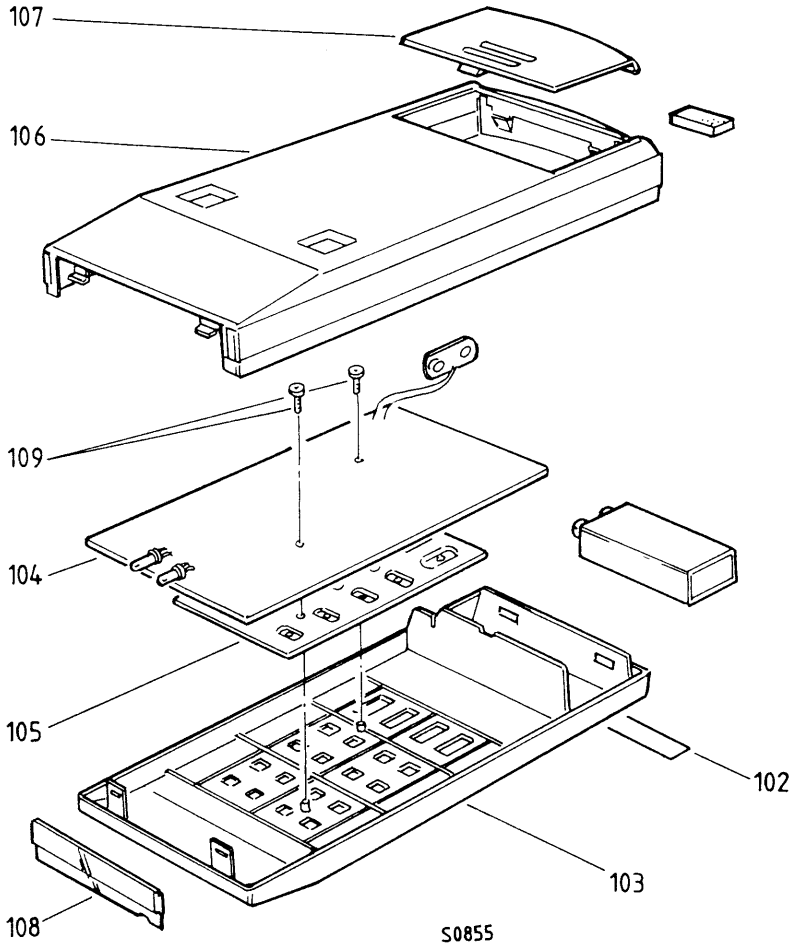
Item in italic applies to Model 16A2 only

When ordering replacements quote model number, reference number (with G prefix), description and part number. Items with circuit references (shown in the illustration), are listed under Component Details.

G1 Main PCB assembly (PC1140), 02M4-003-008
G1a *Main PCB assembly (PC1140), 02M4-003-009*
G2 CRT PCB assembly (PC1141), 01V6-141-004
G3 UHF varicap tuner, 06M8-020-006
G4 Chassis support, 90C8-344-001
G5 Screw, No. 4 × ⅜ Pozidriv hex., SY04-HP06
G6 Heatsink, 90B1-274-005
G8 Transistor clip, 00L4-150-001
G9 Transistor pad, 90B4-111-002
G10 Line & Field scan lead assembly, 90G0-174-002-01G
G11 Tube base lead assembly, 90G0-173-001
G12 Earth butterfly, 90B1-179-001
G13 CRT holder, 00F6-386-001

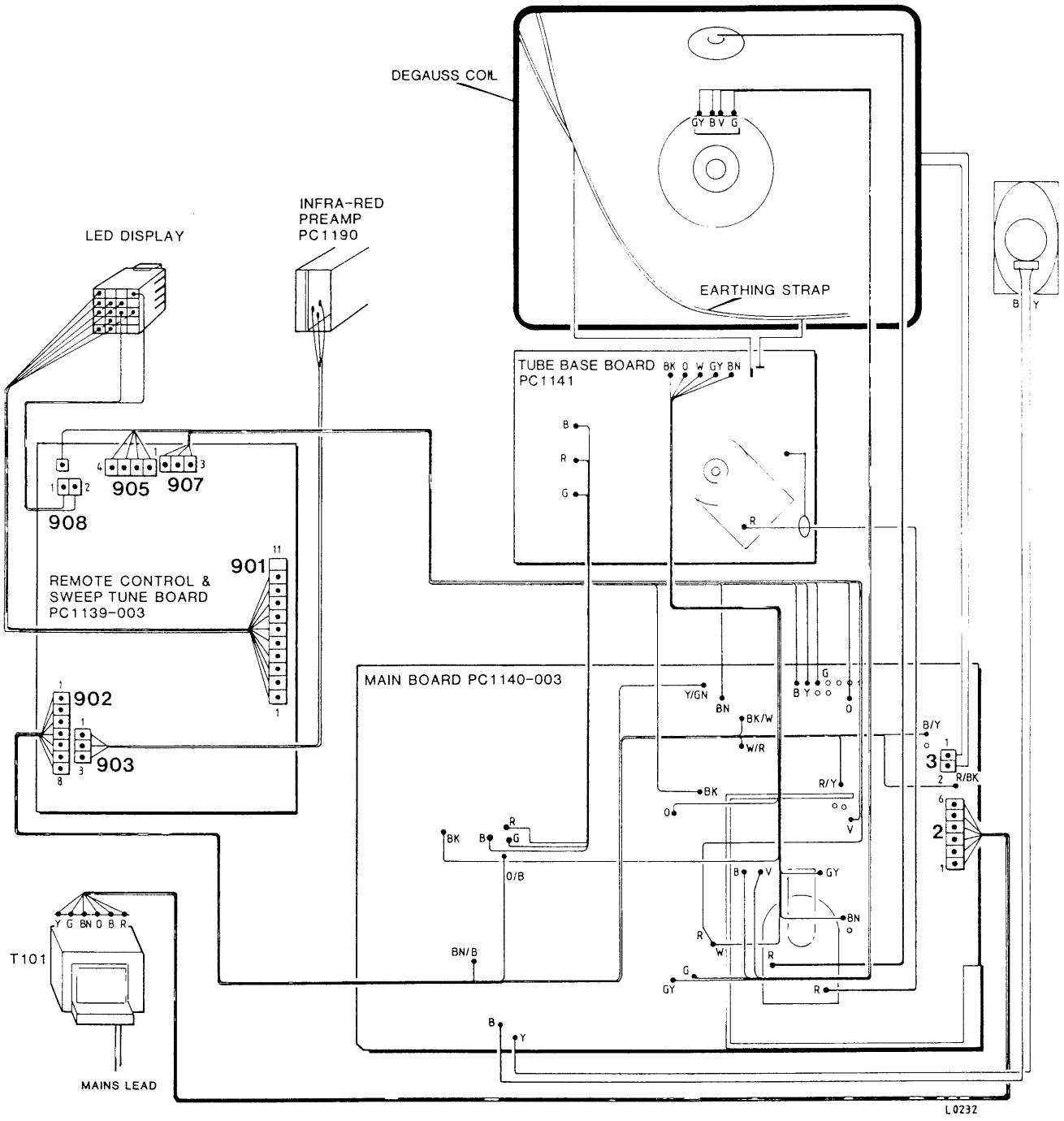


TRANSMITTER T740 (Models 14C2 and 16A2)

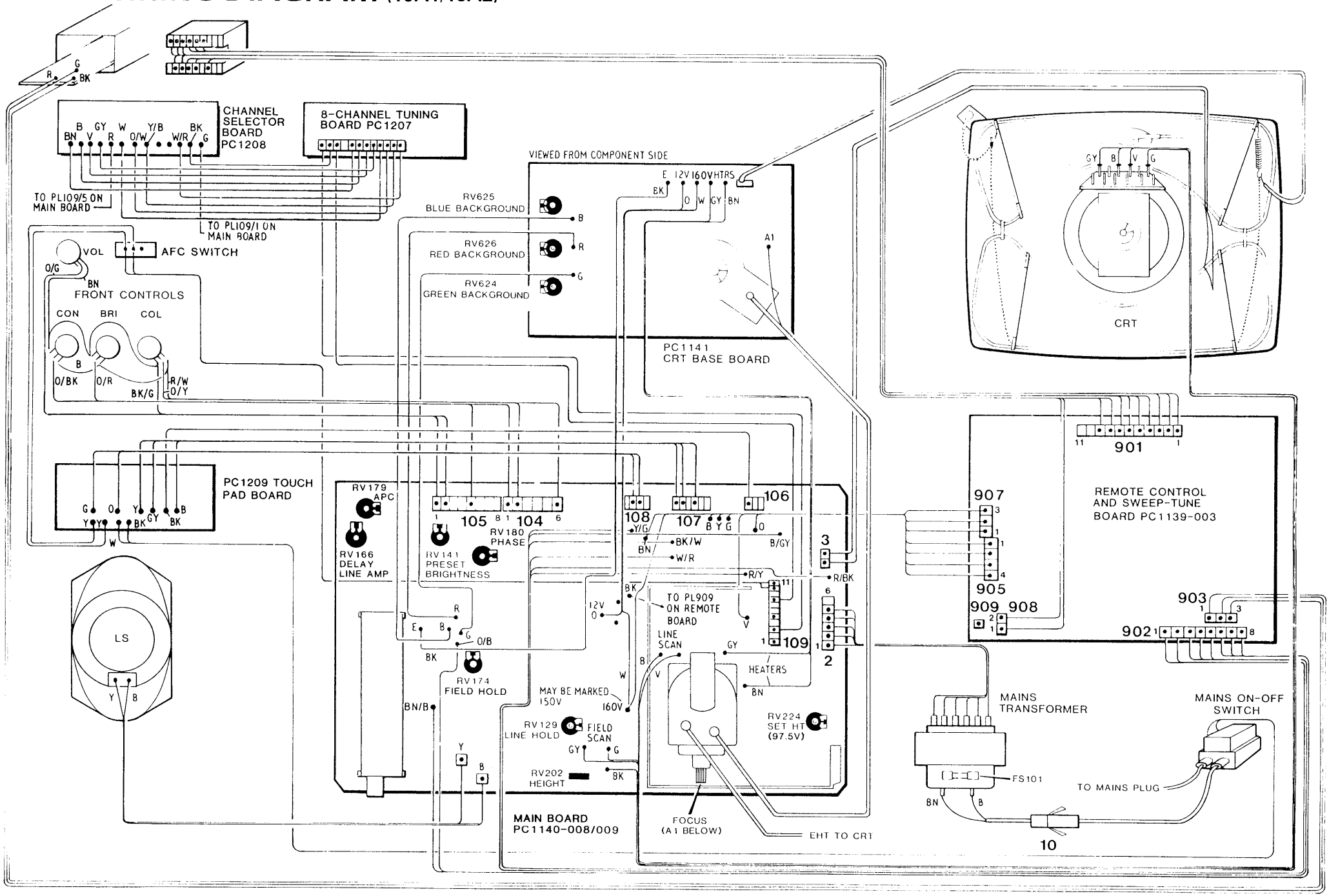


G101 T740 Remote Control transmitter assembly (includes G102 to G109), 90M4-569-013
G102 Emblem, 90A6-022-029
G103 Transmitter top cover, 90A4-167-003
G104 Transmitter PCB and lead assembly, 01V6-159-501
G105 Contact pad, 90E2-033-002
G106 Transmitter base, 90C8-326-002
G107 Battery cover, 90C8-327-002
G108 Transmitter lens, 90C8-328-001
G109 Screw No. 2 × $\frac{3}{16}$" (G104 to G103), SN02-TP03

INTERWIRING DIAGRAM (14C2)

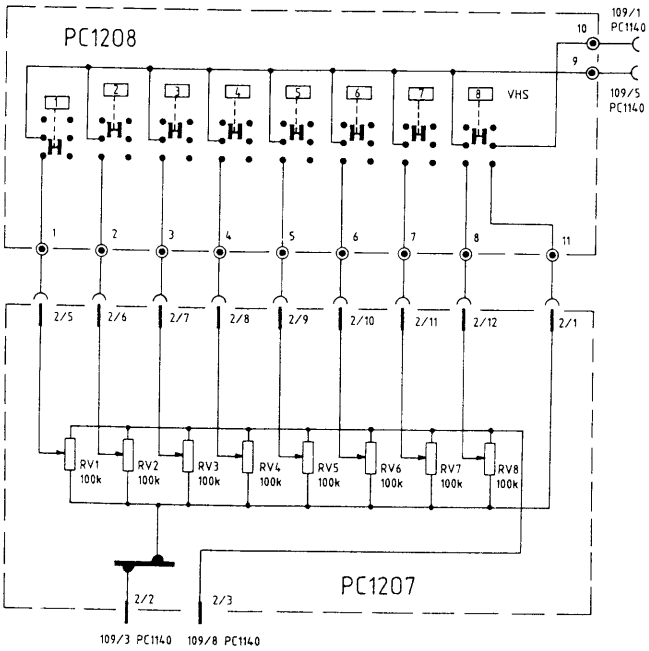


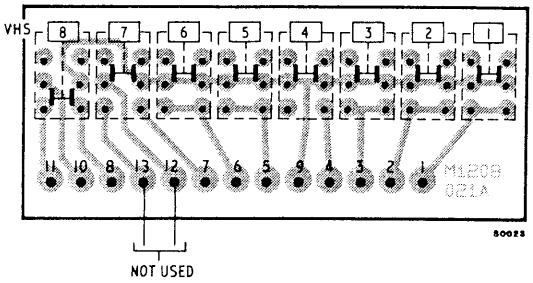
INTERWIRING DIAGRAM (16A1/16A2)

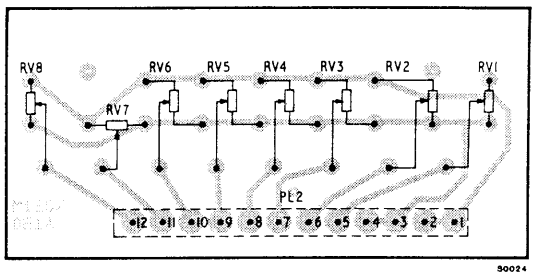


Note: PC1207, PC1208 and PL109 are on Model 16A1 only. Items in blue apply to Model 16A2 only.

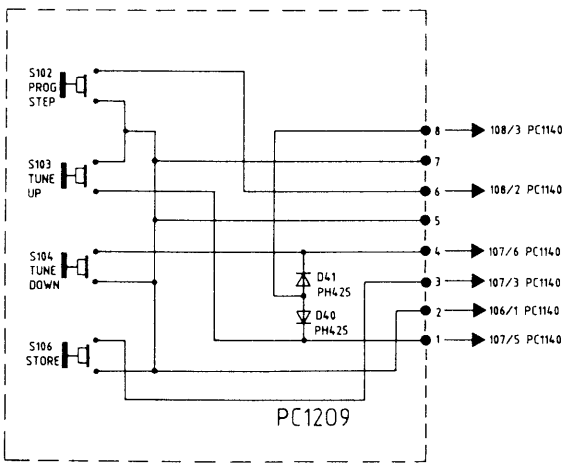
CHANNEL SELECTOR BOARD, PC1208 AND 8-CHANNEL TUNING BOARD, PC1207, (Model 16A1 only)

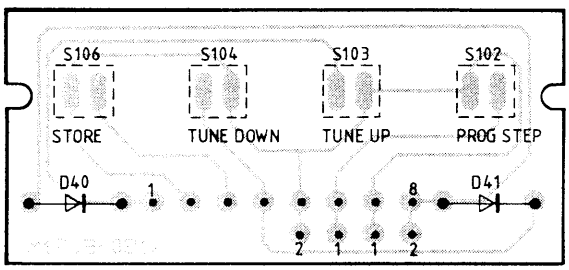






TOUCH PAD BOARD, PC1209 (Model 16A2 only)





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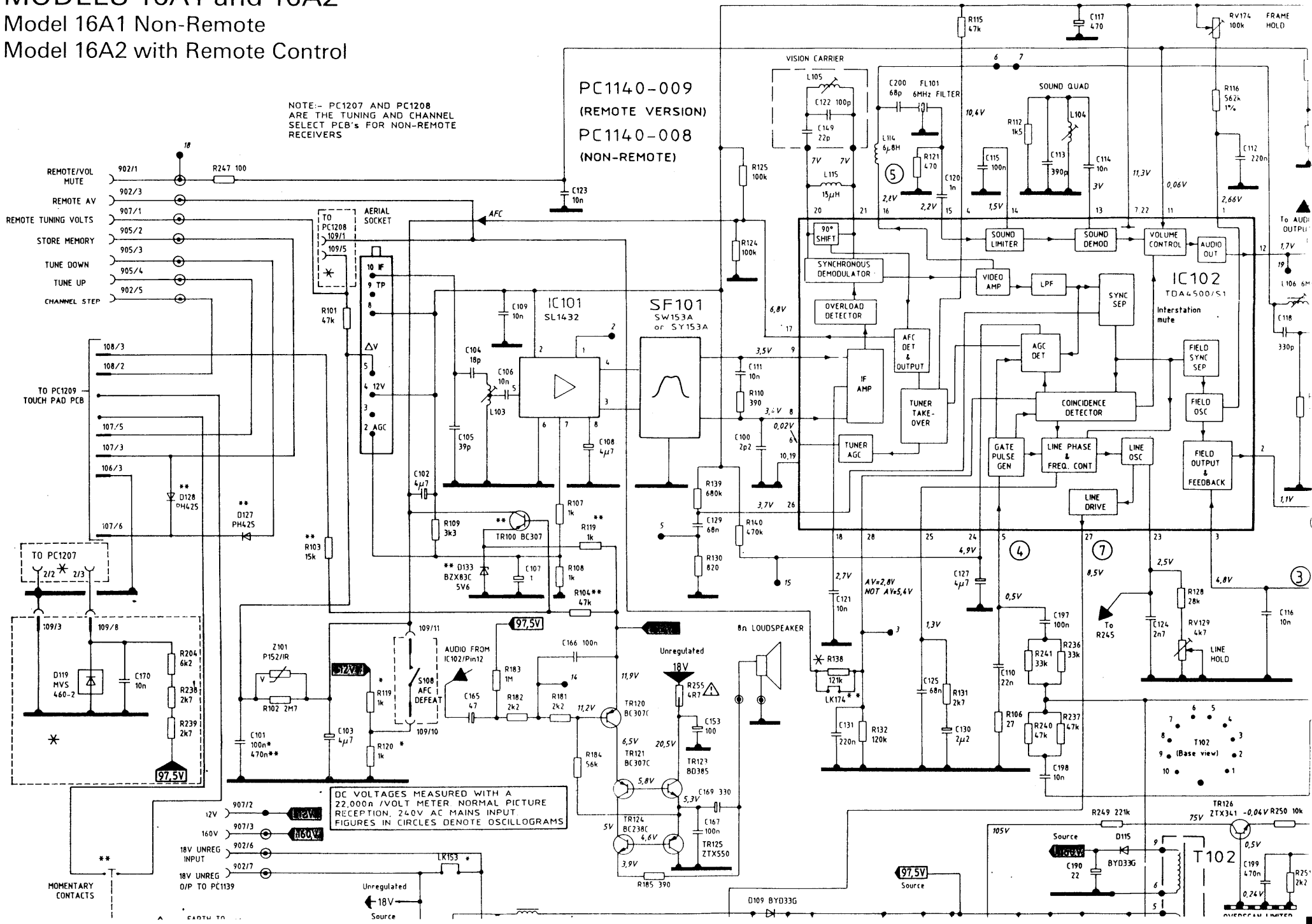
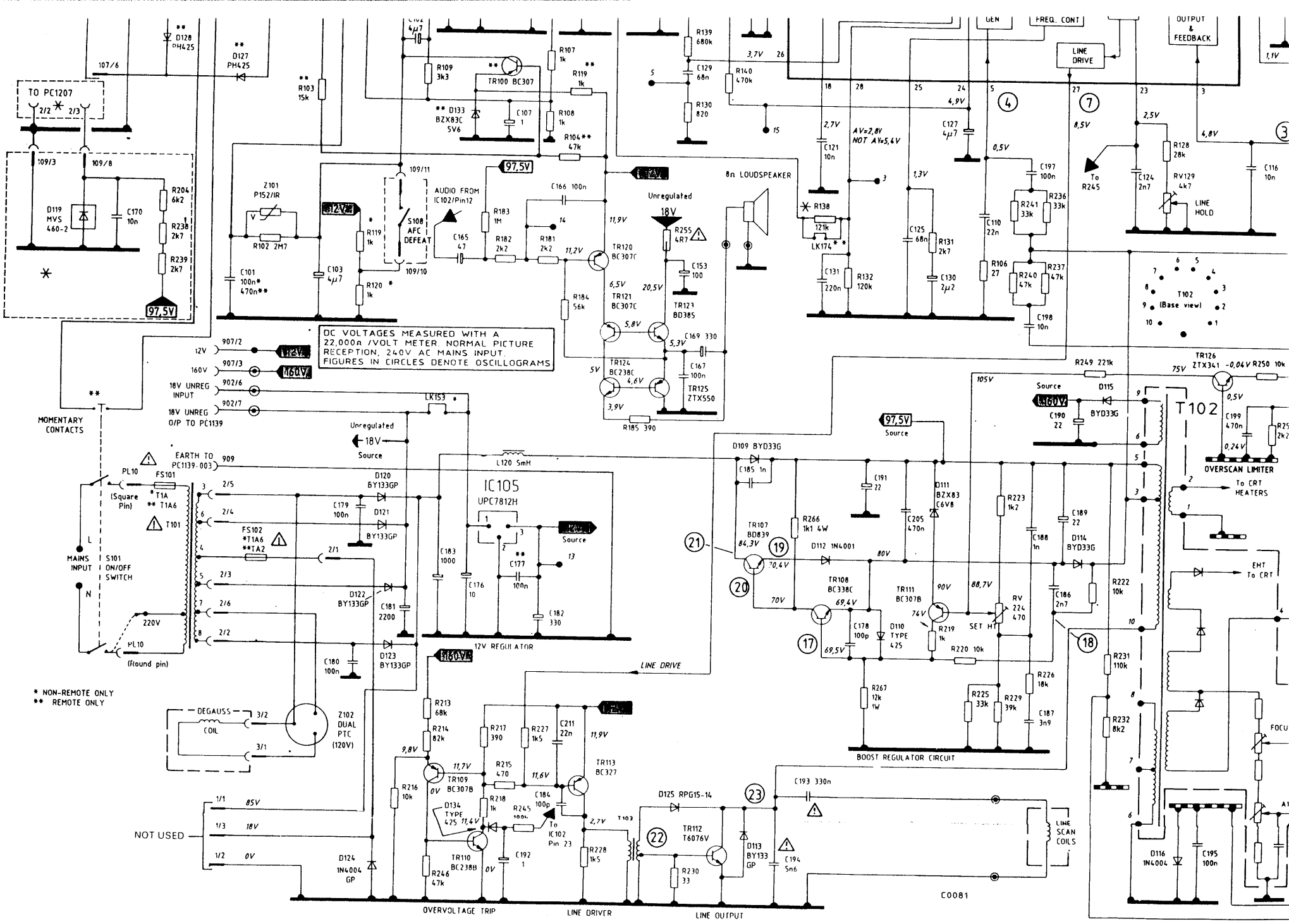
MODELS 16A1 and 16A2

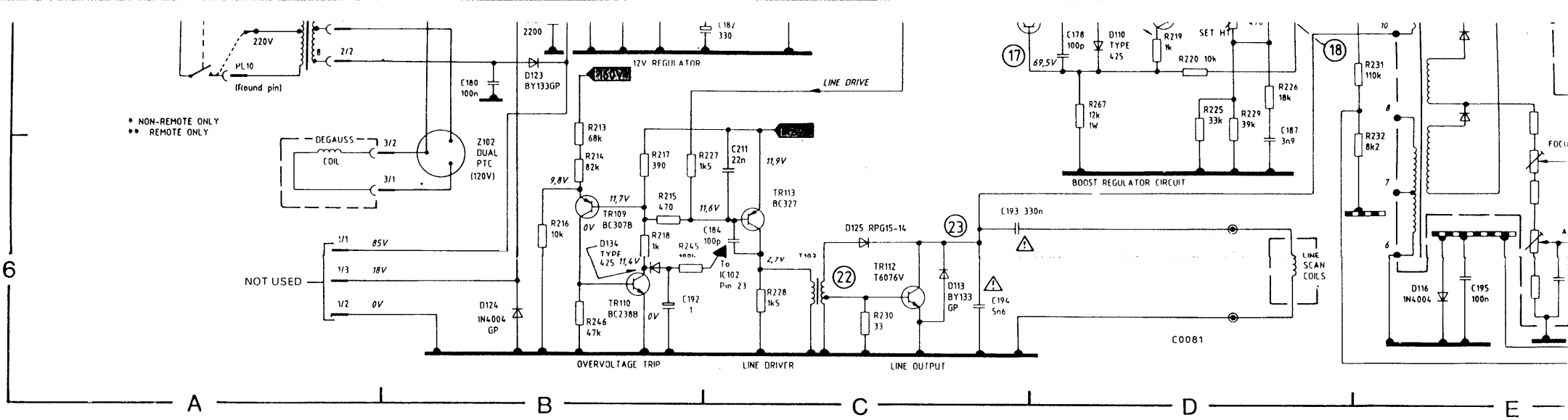
Model 16A1 Non-Remote

Model 16A2 with Remote Control





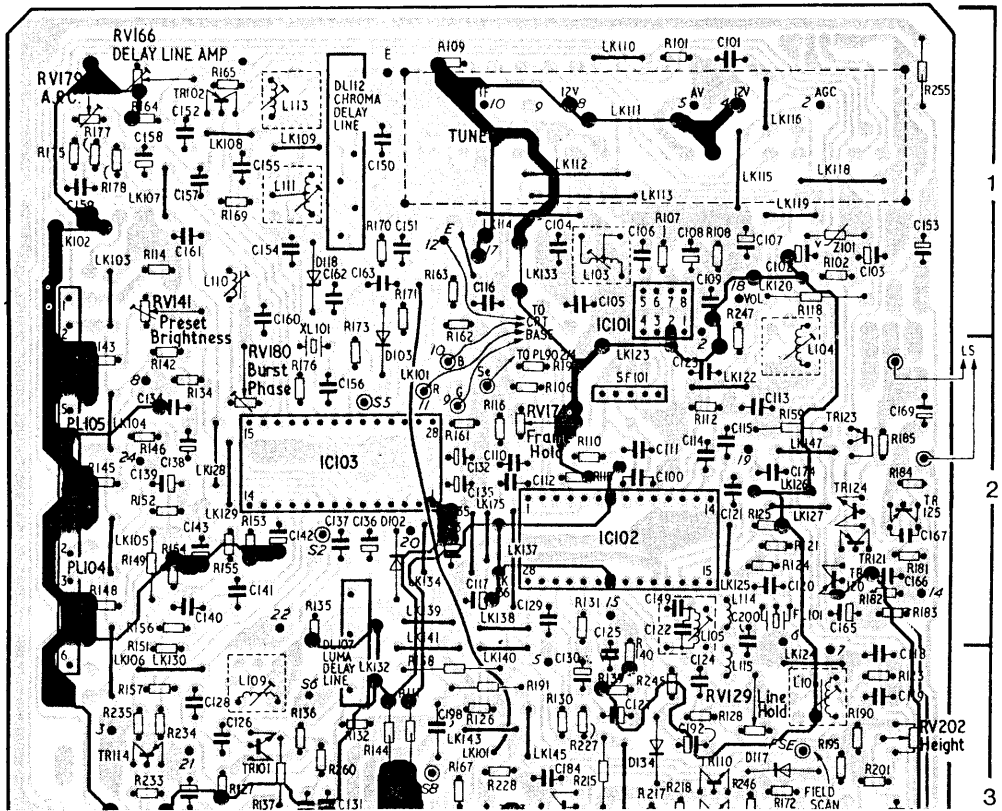
Change of Line Output Transistor, TR112

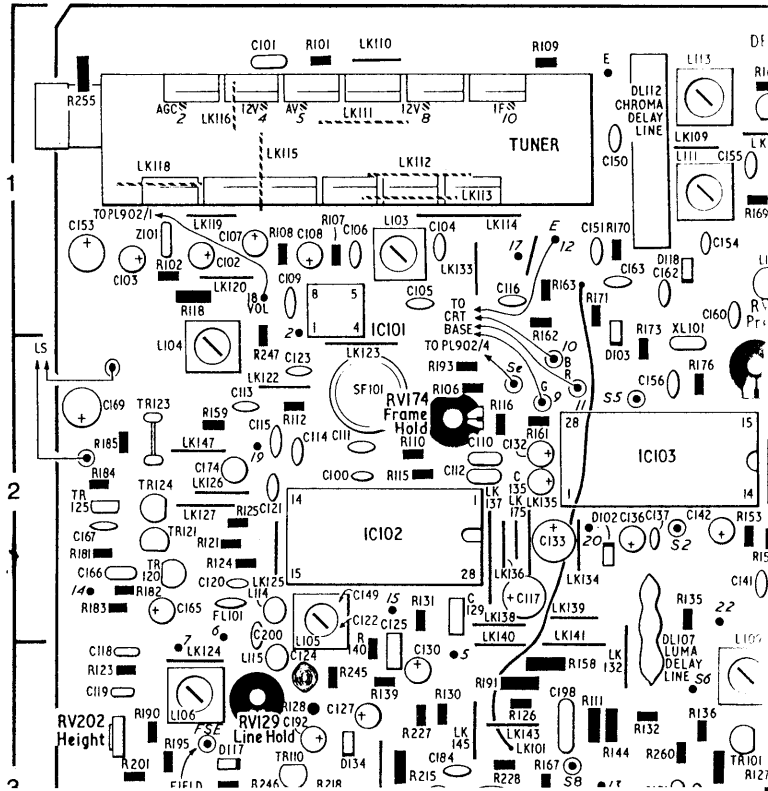


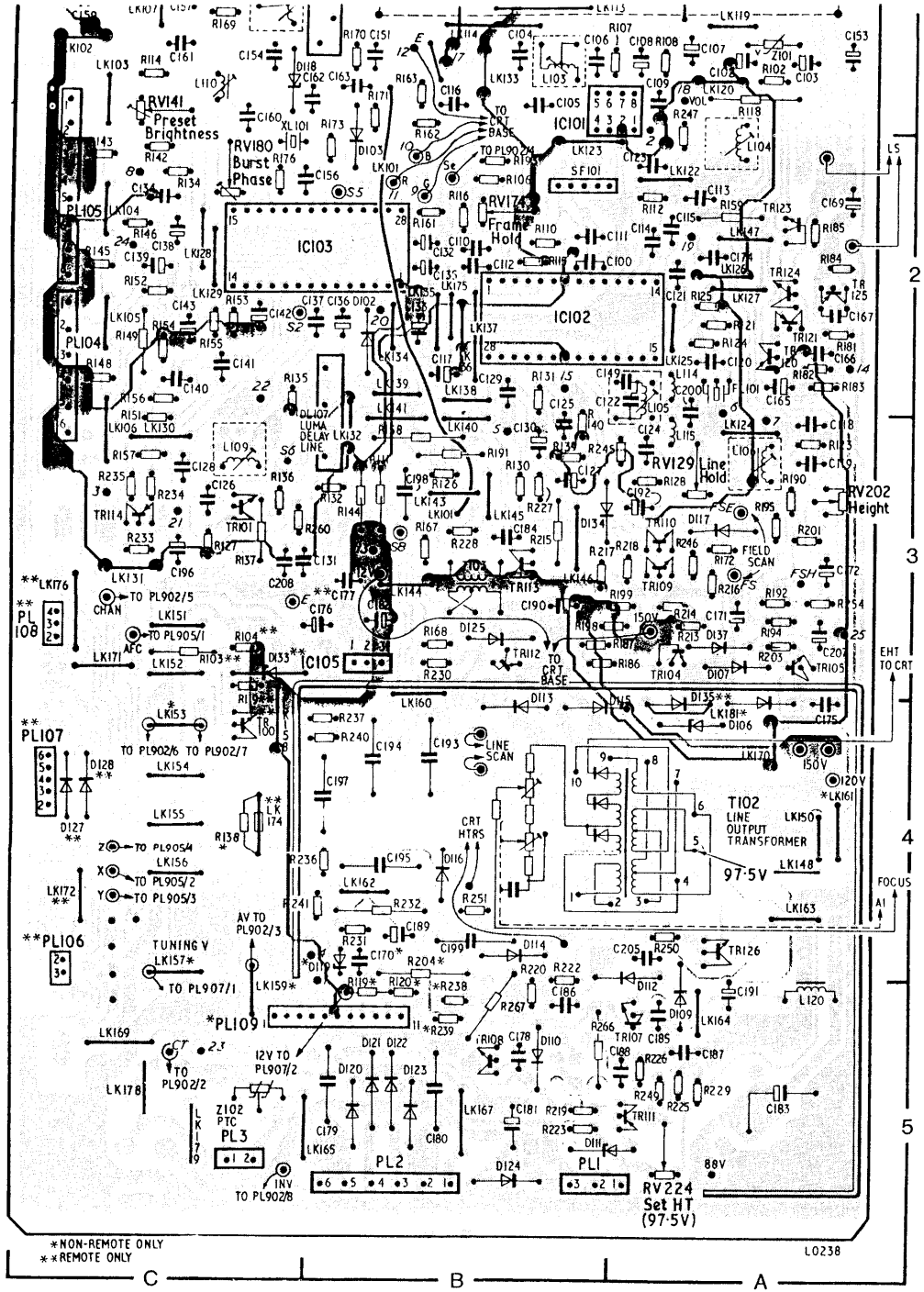
Change of Line Output Transistor, TR112

16-inch models only

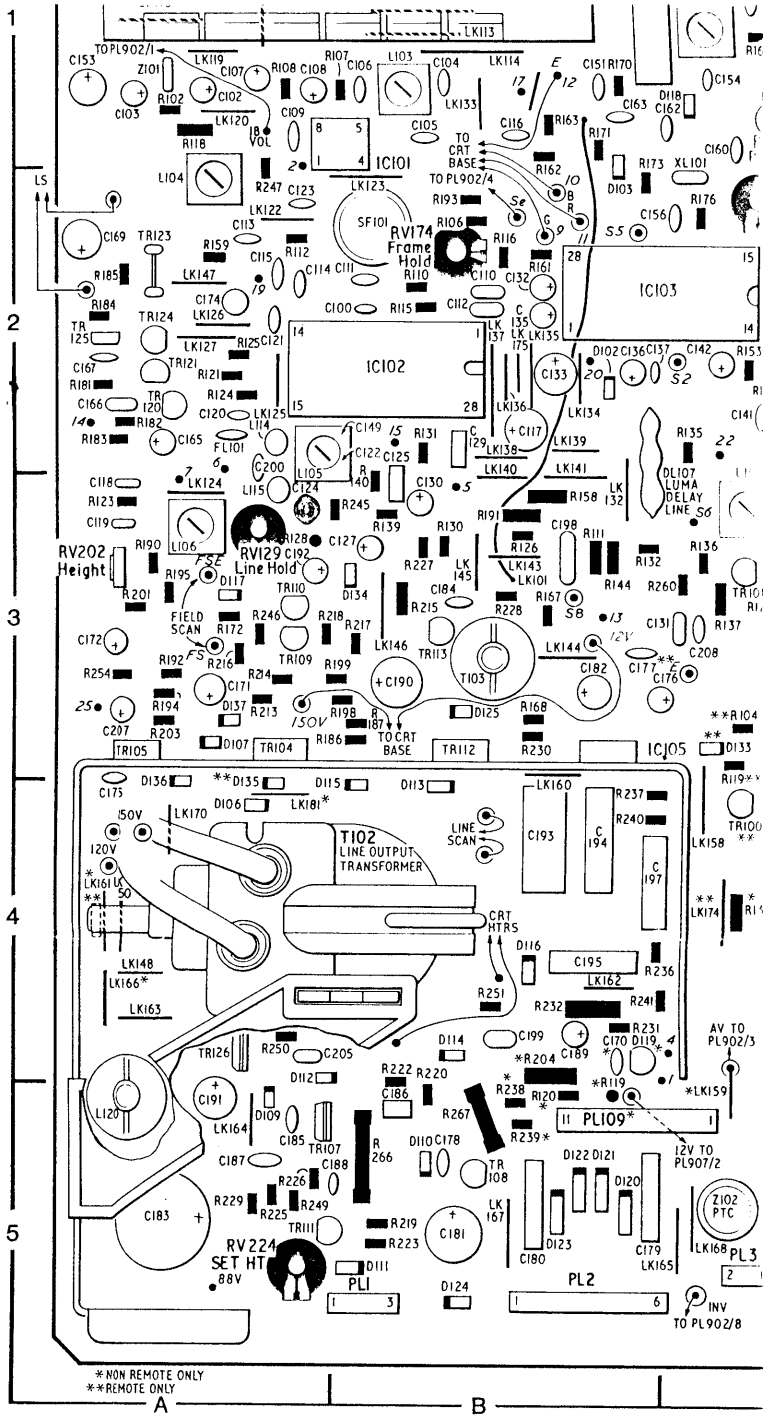
Some early receivers may be fitted with transistor type R4050. This has been replaced by a specially selected device marked T6076V to give improved reliability.



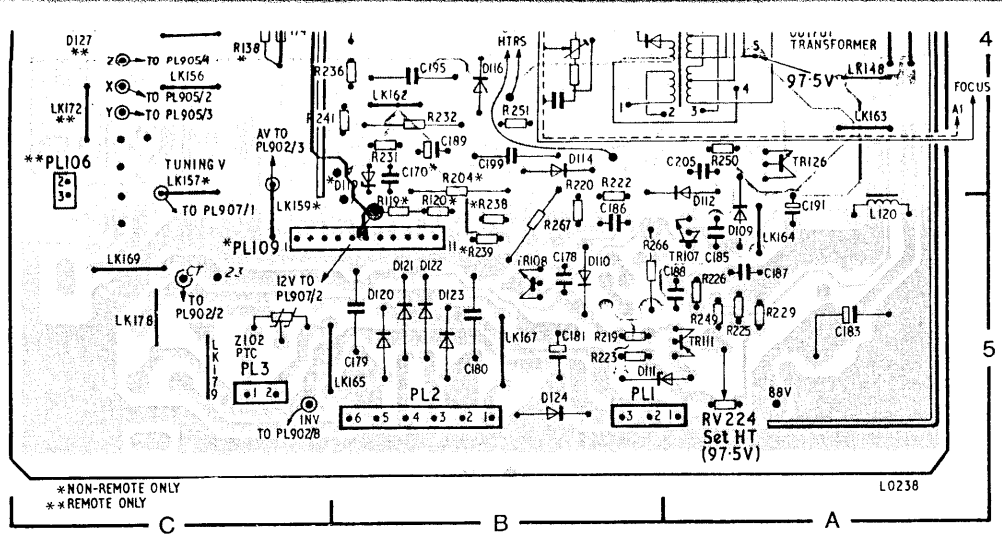




Main Receiver Board, PC1140-008/009 viewed through copper side

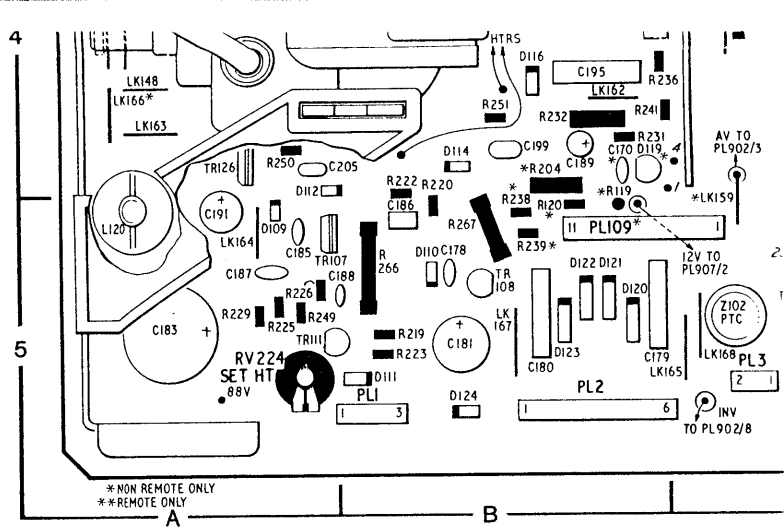


Main Receiver Board, PC1140-008/009 viewed from compone



12V
97.5V
160V

Main Receiver Board, PC1140-008/009 viewed through copper side



Main Receiver Board, PC1140-008/009 viewed from componen

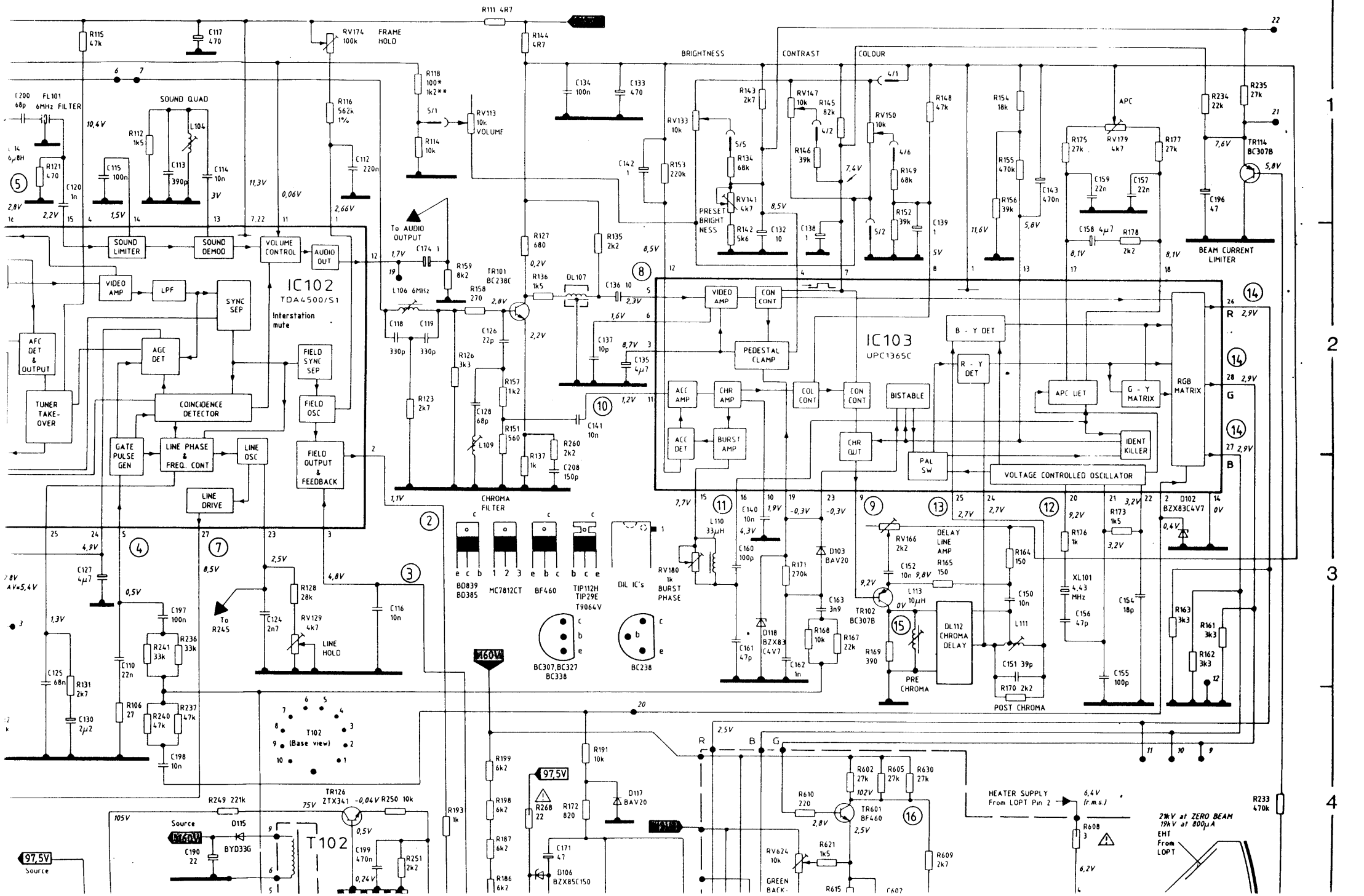
GRID REFERENCES

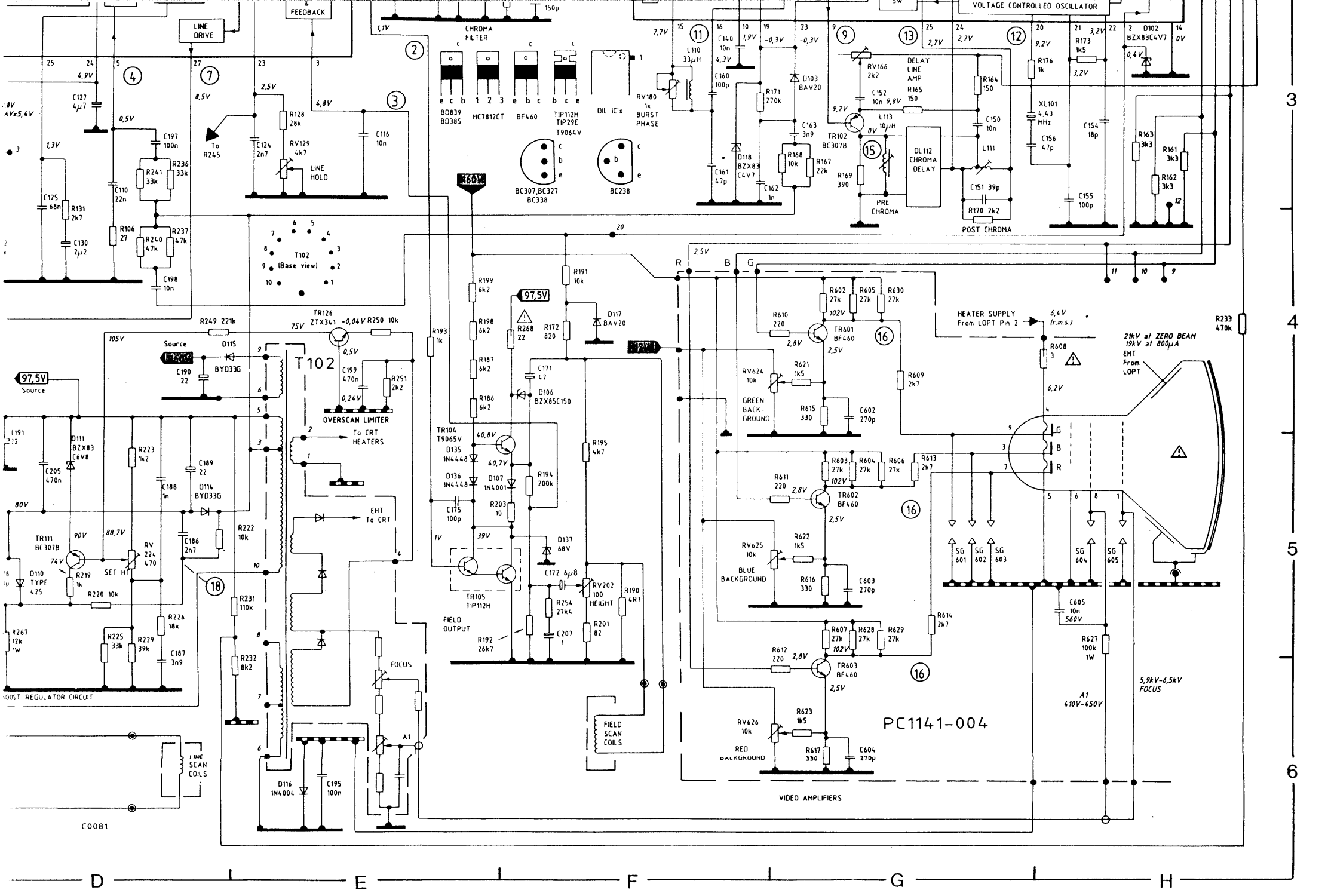
Main Receiver Board

The circuit diagram location is followed by the printed panel location.

PC1140-008/009

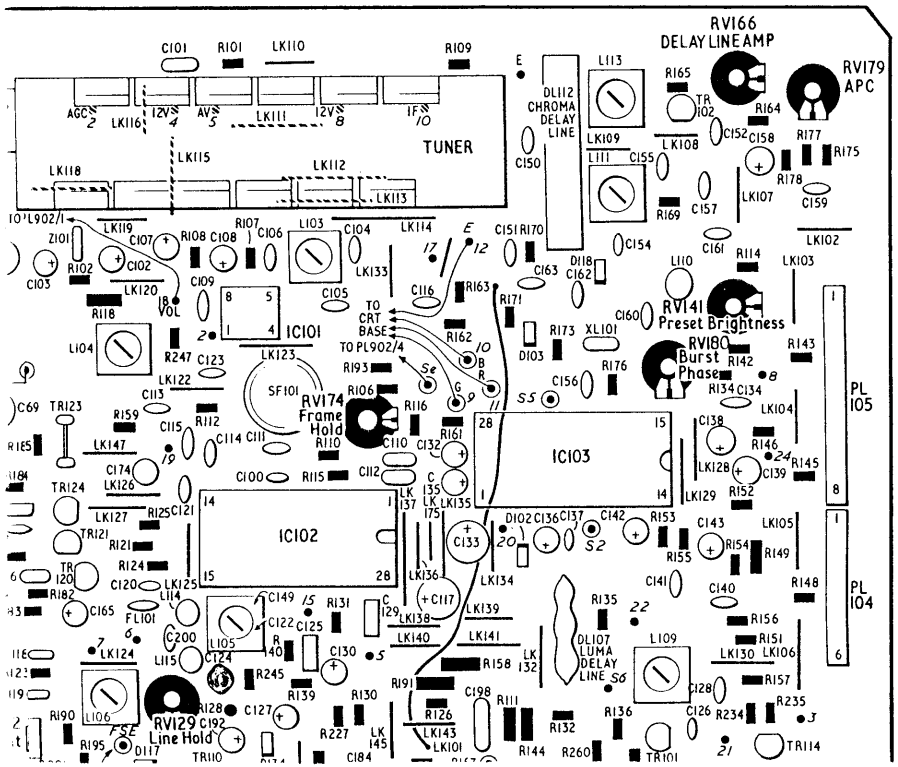
C100 ... C2,*B2*
C101 ... A4,*A1*
C102 ... B3,*A1*
C103 ... B4,*A1*
C104 ... B2,*B1*
C105 ... B2,*B1*
C106 ... B2,*B1*
C107 ... B3,*A1*
C108 ... C2,*A1*
C109 ... B2,*A1*
C110 ... D3,*B2*
C111 ... C2,*B2*
C112 ... E1,*B2*
C113 ... D1,*A2*
C114 ... D1,*A2*
C115 ... D1,*A2*
C116 ... E3,*B1*
C117 ... D1,*B2*
C118 ... E2,*A3*
C119 ... E2,*A3*
C120 ... D1,*A2*
C121 ... C3,*A2*
C122 ... C1,*A2*
C123 ... C1,*A2*
C124 ... E3,*A3*
C125 ... D3,*B2*
C126 ... E2,*C3*
C127 ... D3,*B3*
C128 ... E2,*C3*
C129 ... C3,*B2*
C130 ... D4,*B3*
C131 ... C4,*B3*
C132 ... F2,*B2*
C133 ... F1,*B2*
C134 ... F1,*C2*
C135 ... F2,*B2*
C136 ... F2,*B2*
C137 ... F2,*B2*
C138 ... G2,*C2*
C139 ... G2,*C2*
C140 ... F3,*C2*
C141 ... F2,*C2*
C142 ... F1,*C2*
C143 ... G1,*C2*
C149 ... C1,*A2*
C150 ... G3,*B1*
C151 ... G3,*B1*
C152 ... G3,*C1*
C153 ... C4,*A1*
C154 ... H3,*C1*
C155 ... H3,*C1*
C156 ... H3,*B2*
C157 ... H1,*C1*
C158 ... H2,*C1*
C159 ... H1,*C1*
C160 ... F3,*C1*
C161 ... F3,*C1*
C162 ... F3,*B1*
C163 ... G3,*B1*
C165 ... B4,*A2*
C166 ... C3,*A2*
C167 ... C4,*A2*
C169 ... C4,*A2*
C170* ... A3,*B4*
C171 ... F4,*A3*
C172 ... F5,*A3*
C174 ... E2,*A2*
C175 ... E5,*A4*
C176 ... B5,*B3*
C177** ... B5,*B3*
C178 ... D5,*B5*
C179 ... B5,*B5*
C180 ... B5,*B5*
C181 ... B5,*B5*
C182 ... C5,*B3*
C183 ... B5,*A5*
C184 ... C6,*B3*
C185 ... C5,*A5*
C186 ... D5,*B5*
C187 ... D6,*A5*
C188 ... D5,*B5*
C189 ... D5,*B4*
C190 ... D4,*B3*
C191 ... D5,*A5*
C192 ... B6,*A3*
C193 ... C6,*B4*
C194 ... C6,*B4*
C195 ... E6,*B4*
C196 ... H1,*C3*
C197 ... D3,*B4*
C198 ... D4,*B3*
C199 ... E4,*B4*
C200 ... D1,*A2*
C205 ... D5,*A4*
C207 ... F5,*A3*
C208 ... F3,*C3*
D102 ... H3,*B2*
D103 ... G3,*B2*
D106 ... F4,*A4*
D107 ... F5,*A3*
D109 ... C4,*A5*
D110 ... D5,*B5*
D111 ... D5,*B5*
D112 ... D5,*A4*
D113 ... C6,*B4*
D114 ... D5,*B4*
D115 ... E4,*B4*
D116 ... E6,*B4*
D117 ... F4,*A3*
D118 ... F3,*C1*
D119* ... A3,*B4*
D120 ... B5,*B5*
D121 ... B5,*B5*
D122 ... B5,*B5*
D123 ... B5,*B5*
D124 ... B6,*B5*
D125 ... C6,*B3*
D127** ... A3,*C4*
D128** ... A3,*C4*
D133** ... B3,*C3*
D134 ... B6,*B3*
D135 ... E5,*A4*
D136 ... E5,*A4*
D137 ... F5,*A3*
FL101 ... D1,*A2*
FS101 ... A5,–
FS102 ... B5,–
IC101 ... C2,*B1*
IC102 ... E2,*B2*
IC103 ... G2,*B2*
IC105 ... B5,*B3*
L103 ... B2,*B1*
L104 ... D1,*A2*
L105 ... C1,*A2*
L106 ... E2,*A3*
L109 ... E2,*C3*
L110 ... F3,*C1*
L111 ... G3,*C1*
L113 ... G3,*C1*
L114 ... C1,*A2*
L115 ... C1,*A3*
L120 ... B4,*A5*
PL1 ... A6,*B5*
PL2 ... B5,*B5*
PL3 ... B6,*C5*
PL104 ... G1,*C2*
PL105 ... F1,*C2*
PL106** ... A3,*C4*
PL107** ... A2,*C4*
PL108** ... A2,*C3*
PL109* ... A3,*B5*
R101 ... B2,*A1*
R102 ... B4,*A1*
R103** ... B3,*C3*
R104** ... B3,*C3*
R106 ... D4,*B2*
R107 ... C3,*A1*
R108 ... C3,*A1*
R109 ... G1,*B1*
R110 ... C2,*B2*
R111 ... E1,*B3*
R112 ... D1,*A2*
R114 ... E1,*C1*
R115 ... D1,*B2*
R116 ... E1,*B2*
R118 ... E1,*A1*
R119* ... C3,*B5*
R119** ... C3,*C3*
R120* ... B4,*B5*
R121 ... D1,*A2*
R123 ... E2,*A3*
R124 ... C2,*A2*
R125 ... C1,*A2*
R126 ... E2,*B3*
R127 ... F2,*C3*
R128 ... E3,*A3*
R130 ... C3,*B3*
R131 ... D4,*B2*
R132 ... D4,*B3*
R134 ... F1,*C2*
R135 ... F2,*C2*
R136 ... F2,*C3*
R137 ... F3,*C3*
R138* ... C3,*C4*
R139 ... C3,*B3*
R140 ... C3,*B3*
R142 ... F2,*C2*
R143 ... F1,*C2*
R144 ... F1,*B3*
R145 ... G1,*C2*
R146 ... G1,*C2*
R148 ... G1,*C2*
R149 ... G1,*C2*
R151 ... E2,*C2*
R152 ... G2,*C2*
R153 ... F1,*C2*
R154 ... G1,*C2*
R155 ... G1,*C2*
R156 ... G1,*C2*
R157 ... E2,*C3*
R158 ... E2,*B3*
R159 ... E2,*A2*
R161 ... H3,*B2*
R162 ... H3,*B1*
R163 ... H3,*B1*
R164 ... G3,*C1*
R165 ... G3,*C1*
R167 ... G3,*B3*
R168 ... G3,*B3*
R169 ... G3,*C1*
R170 ... G4,*B1*
R171 ... F3,*B1*
R172 ... F4,*A3*
R173 ... H3,*B1*
R175 ... H1,*C1*
R176 ... G3,*C2*
R177 ... H1,*C1*
R178 ... H2,*C1*
R181 ... C4,*A2*
R182 ... B4,*A2*
R183 ... B3,*A2*
R184 ... C4,*A2*
R185 ... C4,*A2*
R186 ... E4,*B3*
R187 ... E4,*B3*
R190 ... F5,*A3*
R191 ... F4,*B3*
R192 ... F5,*A3*
R193 ... E4,*B2*
R194 ... F5,*A3*
R195 ... F5,*A3*
R198 ... E4,*B3*
R199 ... E4,*A3*
R201 ... F5,*A3*
R203 ... F5,*A3*
R204* ... A3,*B4*
R213 ... B5,*A3*
R214 ... B6,*A3*
R215 ... B6,*B3*
R216 ... B6,*A3*
R217 ... B6,*B3*
R218 ... B6,*A3*
R219 ... D5,*B5*
R220 ... D5,*B3*
R222 ... D5,*B4*
R223 ... D5,*B5*
R225 ... D5,*A5*
R226 ... D5,*A5*
R227 ... B6,*B3*
R228 ... C6,*B3*
R229 ... D5,*A5*
R230 ... C6,*B3*
R231 ... E5,*B4*
R232 ... E6,*B4*
R233 ... H4,*C3*
R234 ... H1,*C3*
R235 ... H1,*C3*
R236 ... D3,*B4*
R237 ... D4,*B4*
R238* ... A4,*B5*
R239* ... A4,*B5*
R240 ... D4,*B4*
R241 ... D3,*B4*
R245 ... B6,*A3*
R246
R247
R249
R250
R251
R254
R255
R260
R266
R267
RV113
RV129
RV133
RV141
RV147
RV150
RV166
RV174
RV179
RV180
RV202
RV224
SF101
T101
T102
T103

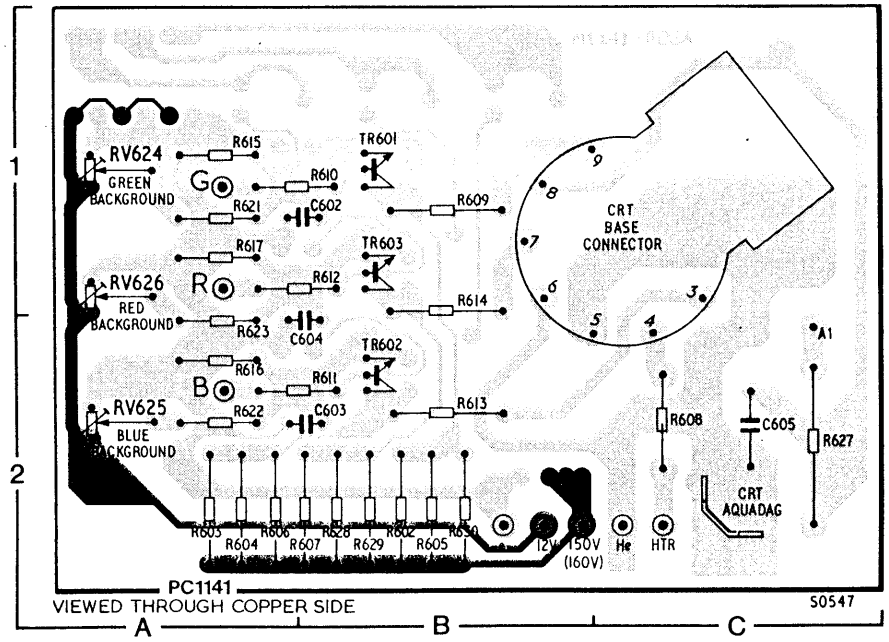

D
E
F
G
H
1
2
3
4
IC102
TDA4500/S1
Interstation mute
IC103
UPC1365C
SOUND QUAD
FL101 6MHz FILTER
SOUND LIMITER
SOUND DEMOD
VOLUME CONTROL
AUDIO OUT
VIDEO AMP
LPF
SYNC SEP
AFC DET & OUTPUT
AGC DET
TUNER TAKE-OVER
COINCIDENCE DETECTOR
FIELD SYNC SEP
FIELD OSC
GATE PULSE GEN
LINE PHASE & FREQ. CONT
LINE OSC
FIELD OUTPUT & FEEDBACK
LINE DRIVE
FRAME HOLD
VOLUME
To AUDIO OUTPUT
L106 6MHz
TR101 BC238C
DL107
CHROMA FILTER
BD839 BD385
MC7812CT
BF460
TIP112H TIP29E T9064V
DIL IC's
BC307,BC327 BC338
BC238
To R245
LINE HOLD
T102
(Base view)
TR126 ZTX341
BYD33G
BRIGHTNESS
CONTRAST
COLOUR
PRESET BRIGHTNESS
APC
BEAM CURRENT LIMITER
TR114 BC307B
VIDEO AMP
CON CONT
PEDESTAL CLAMP
ACC AMP
CHR AMP
COL CONT
BISTABLE
ACC DET
BURST AMP
CHR OUT
PAL SW
B - Y DET
R - Y DET
G - Y MATRIX
RGB MATRIX
APC DET
IDENT KILLER
VOLTAGE CONTROLLED OSCILLATOR
BURST PHASE
DELAY LINE AMP
DL112 CHROMA DELAY
PRE CHROMA
POST CHROMA
TR102 BC307B
D103 BAV20
D118 BZX83 C4V7
D102 BZX83C4V7
TR601 BF460
D117 BAV20
D106 BZX85C150
HEATER SUPPLY From LOPT Pin 2
6,4V (r.m.s.)
2kV at ZERO BEAM
19kV at 800µA
EHT From LOPT
GREEN BACK-
97,5V
Source
460V
105V
75V
10,4V
11,3V
0,06V
2,66V
3V
1,5V
2,2V
2,8V
7,22
7,6V
5,8V
11,6V
8,1V
8,5V
7,4V
5V
1,7V
2,2V
1,6V
8,7V
1,2V
7,7V
1,9V
-0,3V
2,7V
9,2V
9,8V
0V
3,2V
0,4V
4,9V
0,5V
8,5V
2,5V
4,8V
1,3V
1,1V
0,24V
-0,04V
2,8V
2,5V
102V
6,2V
2,9V
0V
R111 4R7
R144 4R7
R115 47k
C117 470
RV174 100k
R118 100* 1k2**
RV113 10k
R114 10k
R116 562k 1%
C112 220n
C200 68p
C121 470
C120 1n
C115 100n
R112 1k5
C113 390p
L104
C114 10n
C134 100n
C133 470
R143 2k7
RV147 10k
R145 82k
R146 39k
RV150 10k
R148 47k
R149 68k
R152 39k
RV133 10k
R153 220k
C142 1
RV141 4k7
R134 68k
R142 5k6
C132 10
C138 1
C139 1
R154 18k
R155 470k
R156 39k
C143 470n
R175 27k
RV179 4k7
R177 27k
C159 22n
C157 22n
C158 4µ7
R178 2k2
R234 22k
R235 27k
C196 47
R127 680
R135 2k2
R136 1k5
C136 10
R159 8k2
R158 270
C118 330p
C119 330p
C126 22p
R126 3k3
R123 2k7
R157 1k2
C128 68p
L109
R151 560
R137 1k
C141 10n
R260 2k2
C208 150p
C137 10p
C135 4µ7
C174 1
C127 4µ7
C197 100n
R236 33k
R241 33k
C110 22n
R106 27
R237 47k
R240 47k
C198 10n
C125 68n
R131 2k7
C130 2µ2
R128 28k
C124 2n7
RV129 4k7
C116 10n
L110 33µH
RV180 1k
C140 10n
C160 100p
R171 270k
C161 47p
C162 1n
C163 3n9
R168 10k
R167 22k
RV166 2k2
C152 10n
L113 10µH
R164 150
R165 150
C150 10n
L111
C151 39p
R170 2k2
R169 390
R176 1k
R173 1k5
XL101 4,43 MHz
C156 47p
C154 18p
C155 100p
R163 3k3
R161 3k3
R162 3k3
R199 6k2
R198 6k2
R187 6k2
R186 6k2
R191 10k
R268 22
R172 820
C171 47
R193 1k
R249 221k
R250 10k
C190 22
C199 470n
R251 2k2
D115
R602 27k
R605 27k
R630 27k
R610 220
R621 1k5
RV624 10k
R609 2k7
R608 3
R615
C602
R233 470k
R
G
B



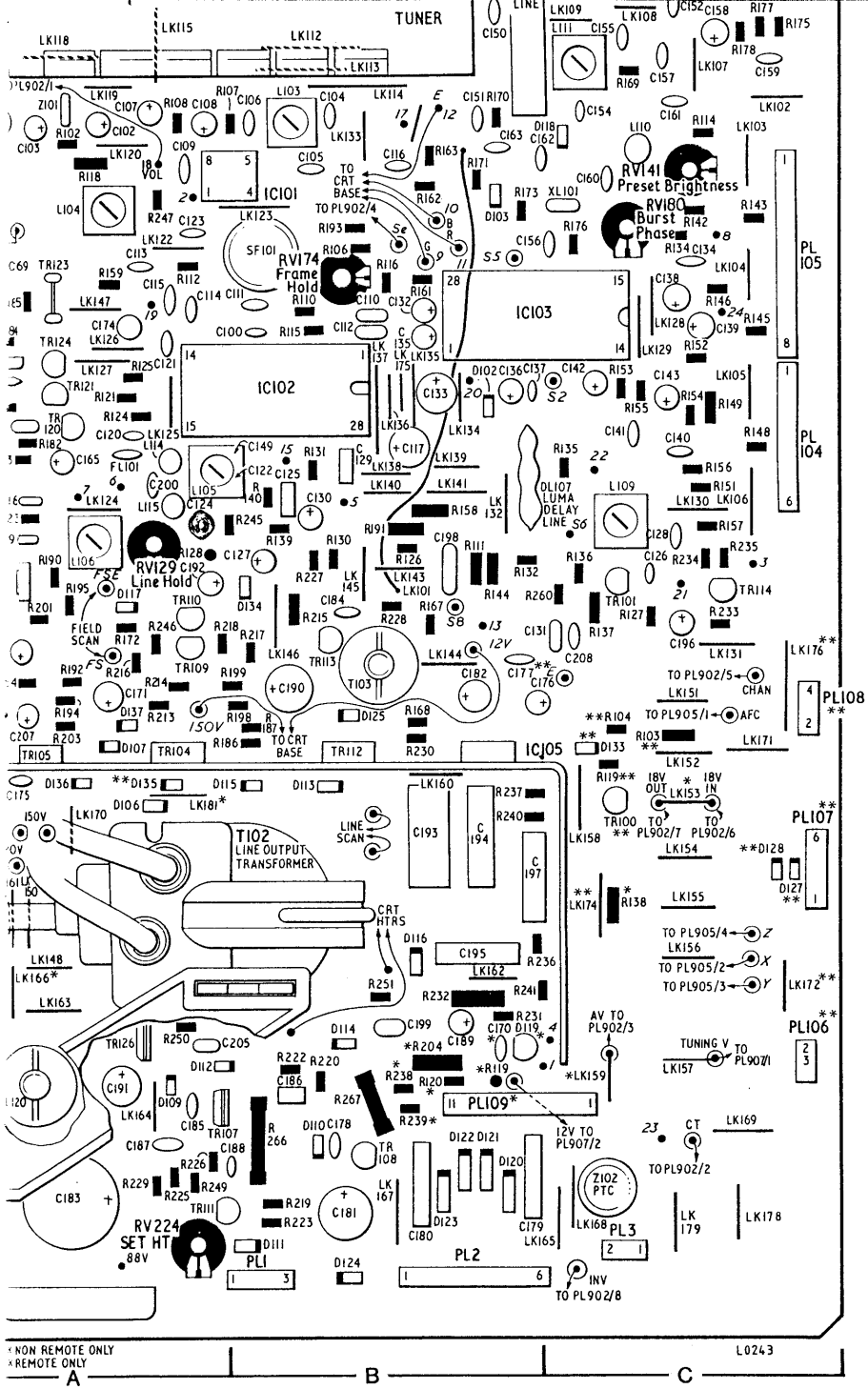
Oscillograms denoted by figures in circles are similar to those shown on PC1140 Sheet, Issue Two

Oscillograms denoted by figures in circles are similar to those shown on PC1140 Sheet, Issue Two

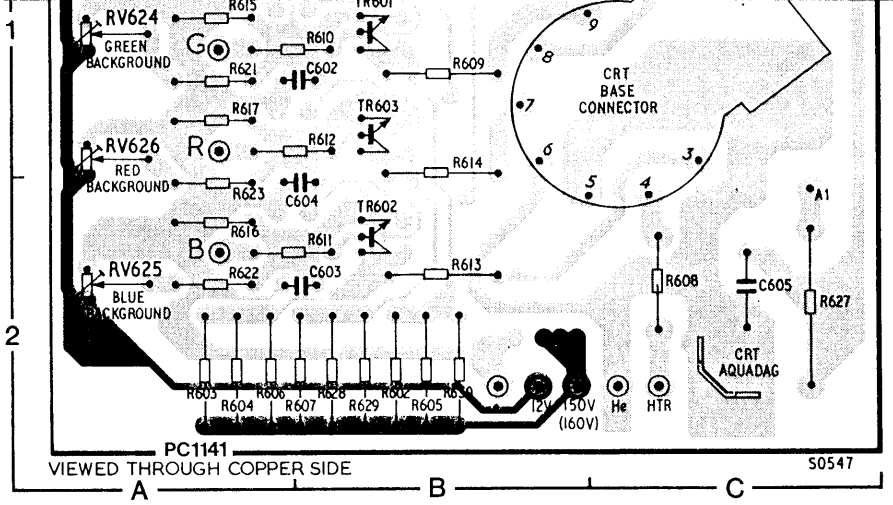




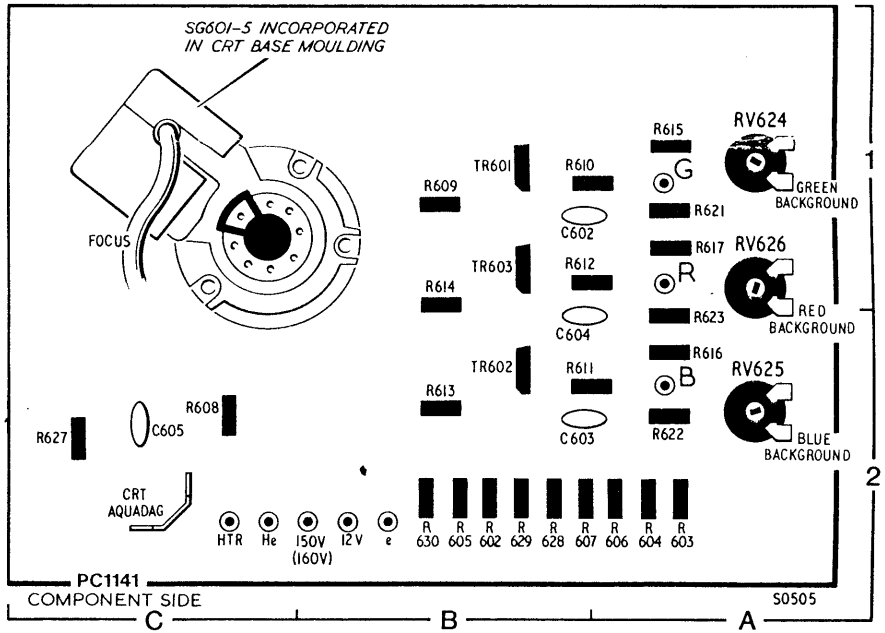
CRT Base Board, PC1141 viewed through copper side
(Used on both 14-inch and 16-inch models)



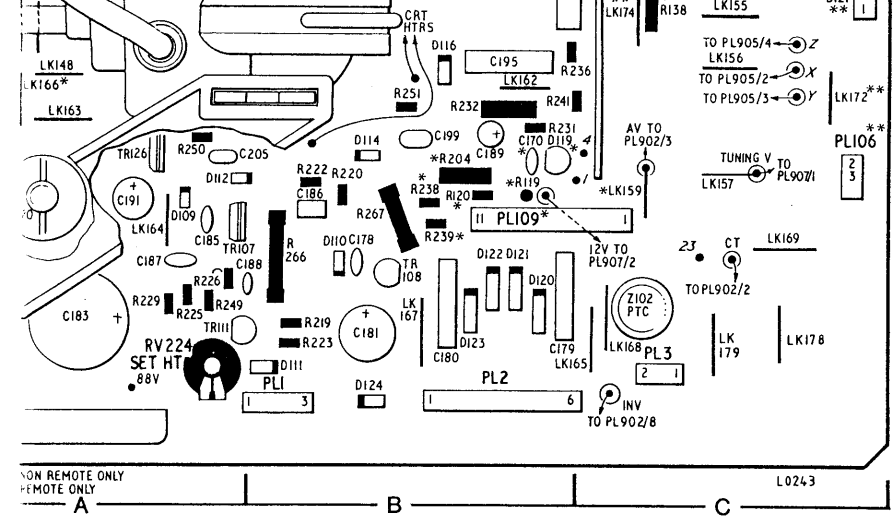
Main Receiver Board, PC1140-008/009 viewed from component side



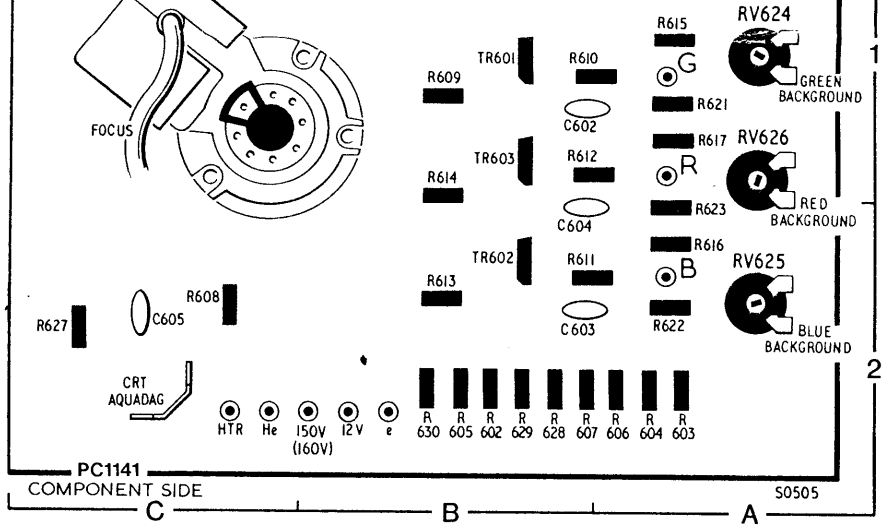
CRT Base Board, PC1141 viewed through copper side
(Used on both 14-inch and 16-inch models)



CRT Base Board, PC1141 viewed from component side
(Used on both 14-inch and 16-inch models)



Main Receiver Board, PC1140-008/009 viewed from component side



CRT Base Board, PC1141 viewed from component side
(Used on both 14-inch and 16-inch models)

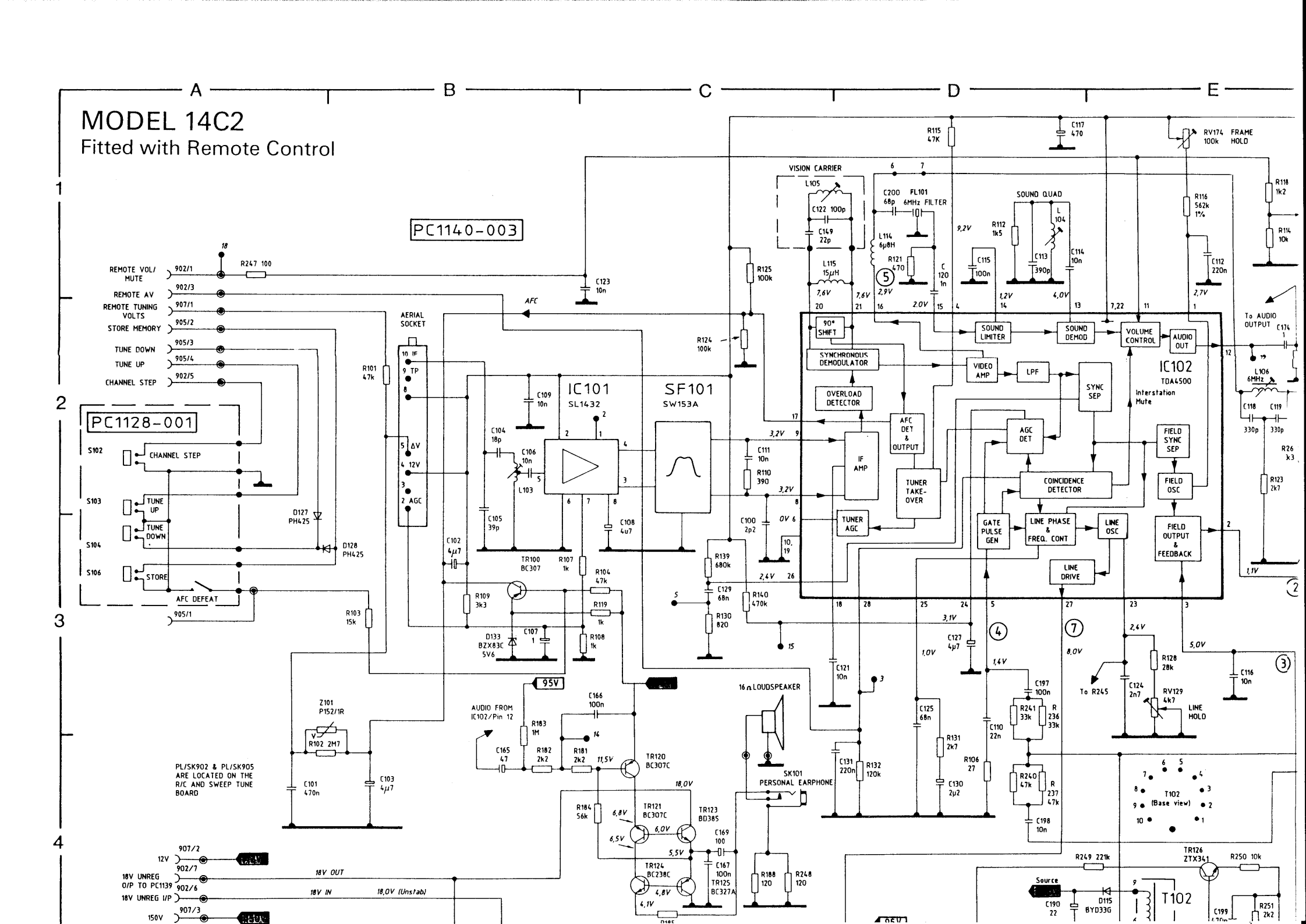
1	D4,*B2*	R165	G3,*C1*	R204*	A3,*B4*	R246	B6,*A3*	TR100**	B3,*C4*		
2	D4,*B3*	R167	G3,*B3*	R213	B5,*A3*	R247	A1,*A2*	TR101	F2,*C3*		
4	F1,*C2*	R168	G3,*B3*	R214	B6,*A3*	R249	D4,*A5*	TR102	G3,*C1*		
5	F2,*C2*	R169	G3,*C1*	R215	B6,*B3*	R250	E4,*A4*	TR104	F5,*A3*		
6	F2,*C3*	R170	G4,*B1*	R216	B6,*A3*	R251	E4,*B3*	TR105	E5,*A3*		
7	F3,*C3*	R171	F3,*B1*	R217	B6,*B3*	R254	F5,*A3*	TR107	C5,*A5*		
8*	C3,*C4*	R172	F4,*A3*	R218	B6,*A3*	R255	C3,*A1*	TR108	D5,*B5*		
9	C3,*B3*	R173	H3,*B1*	R219	D5,*B5*	R260	F2,*B3*	TR109	B6,*A3*		
0	C3,*B3*	R175	H1,*C1*	R220	D5,*B3*	R266	C5,*B5*	TR110	B6,*A3*		
2	F2,*C2*	R176	G3,*C2*	R222	D5,*B4*	R267	D5,*B5*	TR111	D5,*A5*		
3	F1,*C2*	R177	H1,*C1*	R223	D5,*B5*			TR112	C6,*B3*		
4	F1,*B3*	R178	H2,*C1*	R225	D5,*A5*	RV113	E1,–	TR113	C6,*B3*		
5	G1,*C2*	R181	C4,*A2*	R226	D5,*A5*	RV129	E3,*A3*	TR114	H1,*C3*		
6	G1,*C2*	R182	B4,*A2*	R227	B6,*B3*	RV133	F1,–	TR120	C4,*A2*		
8	G1,*C2*	R183	B3,*A2*	R228	C6,*B3*	RV141	F1,*C1*	TR121	C4,*A2*		
9	G1,*C2*	R184	C4,*A2*	R229	D5,*A5*	RV147	G1,–	TR123	C4,*A2*		
1	E2,*C2*	R185	C4,*A2*	R230	C6,*B3*	RV150	G1,–	TR124	C4,*A2*		
2	G2,*C2*	R186	E4,*B3*	R231	E5,*B4*	RV166	G3,*C1*	TR125	C4,*A2*		
3	F1,*C2*	R187	E4,*B3*	R232	E6,*B4*	RV174	E1,*B2*	TR126	E4,*A4*		
4	G1,*C2*	R190	F5,*A3*	R233	H4,*C3*	RV179	H1,*C1*				
5	G1,*C2*	R191	F4,*B3*	R234	H1,*C3*	RV180	F3,*C2*	XL101	G3,*C1*		
6	G1,*C2*	R192	F5,*A3*	R235	H1,*C3*	RV202	F5,*A3*				
7	E2,*C3*	R193	E4,*B2*	R236	D3,*B4*	RV224	D5,*A5*	Z101	B3,*A1*		
8	E2,*B3*	R194	F5,*A3*	R237	D4,*B4*			Z102	B6,*C5*		
9	E2,*A2*	R195	F5,*A3*	R238*	A4,*B5*	SF101	C2,*B2*				
1	H3,*B2*	R198	E4,*B3*	R239*	A4,*B5*			* non-remote			
2	H3,*B1*	R199	E4,*A3*	R240	D4,*B4*	T101	A5,–	** remote			
3	H3,*B1*	R201	F5,*A3*	R241	D3,*B4*	T102	E4,*B4*				
4	G3,*C1*	R203	F5,*A3*	R245	B6,*A3*	T103	C6,*B3*				

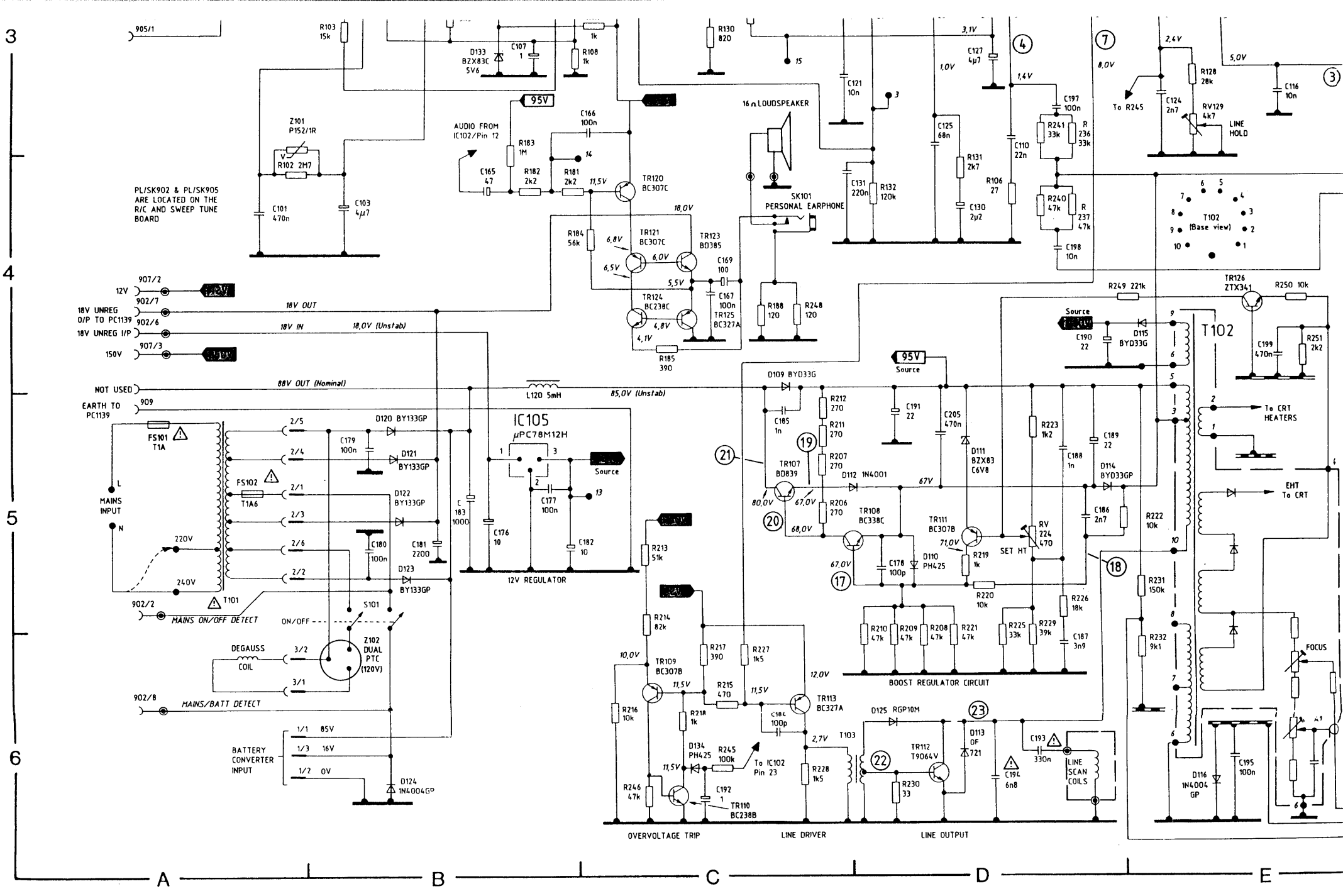
PC1141

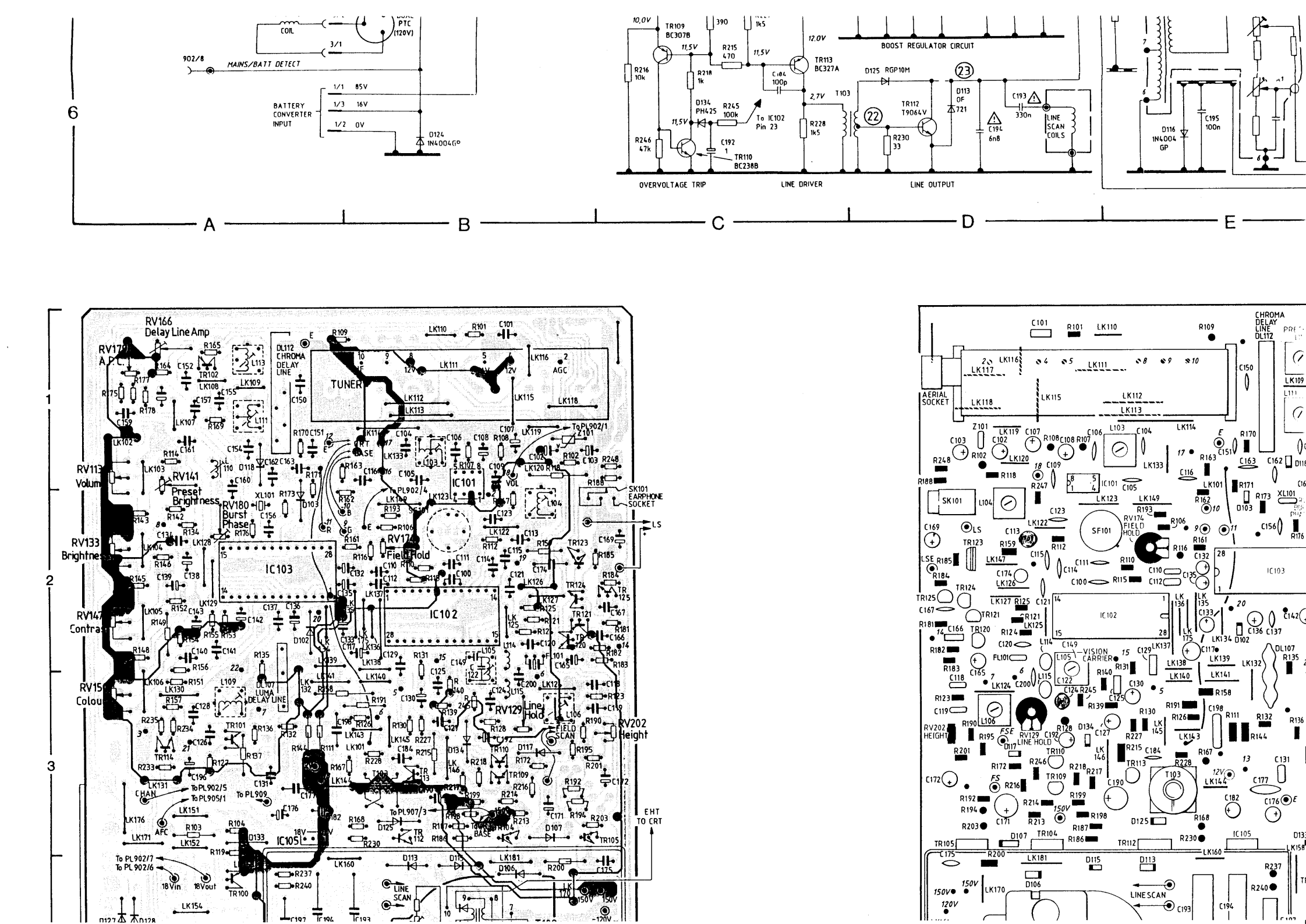
C602	G4,*B1*	**R602**	G3,*B2*	**RV624**	G4,*A1*
C603	G4,*B2*	**R603**	G4,*A2*	**RV625**	G4,*A2*
C604	G5,*B2*	**R604**	G4,*A2*	**RV626**	G5,*A1*
C605	H5,*C2*	**R605**	G3,*B2*		
		R606	G4,*A2*	**SG601**	G4,–
		R607	G5,*B2*	**SG602**	G4,–
		R608	H4,*C2*	**SG603**	G4,–
		R609	G4,*B1*	**SG604**	H4,–
		R610	G4,*B1*	**SG605**	H4,–
		R611	G4,*A2*		
		R612	G5,*B1*	**TR601**	G4,*B1*
		R613	G4,*B2*	**TR602**	G4,*B2*
		R614	G5,*B1*	**TR603**	G5,*B1*
		R615	G4,*A1*		
		R616	G4,*A2*		
		R617	G5,*A1*		
		R621	G4,*A1*		
		R622	G4,*A2*		
		R623	G5,*A2*		
		R627	H5,*C2*		
		R628	G5,*B2*		
		R629	G5,*B2*		
		R630	G3,*B2*		

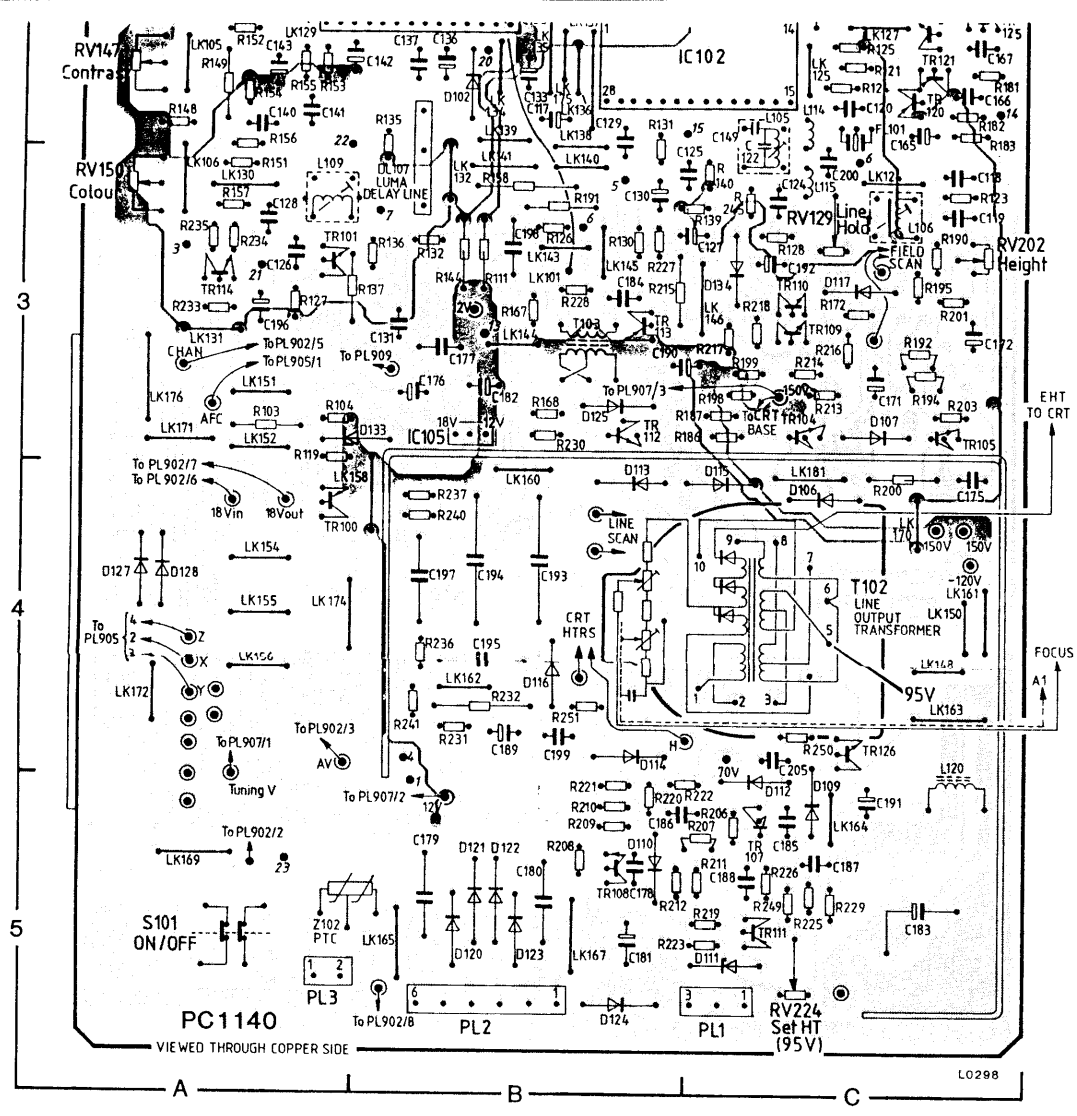
MODEL 14C2

Fitted with Remote Control

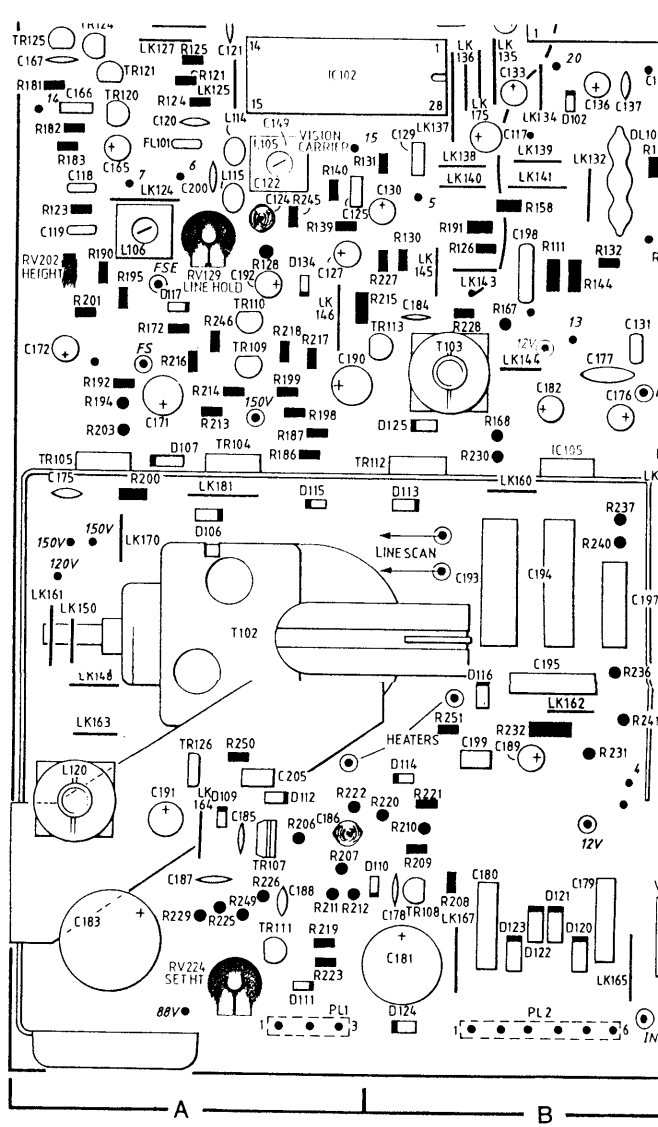



PL/SK902 & PL/SK905 ARE LOCATED ON THE R/C AND SWEEP TUNE BOARD
AUDIO FROM IC102/Pin 12
16 n LOUDSPEAKER
SK101 PERSONAL EARPHONE
18V UNREG O/P TO PC1139
18V UNREG I/P
18V OUT
18V IN
18,0V (Unstab)
88V OUT (Nominal)
85,0V (Unstab)
EARTH TO PC1139
MAINS INPUT
MAINS ON/OFF DETECT
MAINS/BATT DETECT
DEGAUSS COIL
BATTERY CONVERTER INPUT
IC105 μPC78M12H
12V REGULATOR
BOOST REGULATOR CIRCUIT
OVERVOLTAGE TRIP
LINE DRIVER
LINE OUTPUT
SET HT
LINE HOLD
FOCUS
To CRT HEATERS
EHT To CRT
To R245
To IC102 Pin 23
LINE SCAN COILS
Source
95V
T102 (Base view)
A
B
C
D
E


COIL
PTC (120V)
3/1
902/8
MAINS/BATT DETECT
BATTERY CONVERTER INPUT
1/1 8.5V
1/3 16V
1/2 0V
D124 1N4004GP
10.0V
TR109 BC307B
11.5V
R215 470
12.0V
BOOST REGULATOR CIRCUIT
R216 10k
R218 1k
TR113 BC327A
C104 100p
D125 RGP10M
T103
TR112 T9064V
D113 OF 721
C193 330n
LINE SCAN COILS
D134 PH425
R245 100k
To IC102 Pin 23
2.7V
R228 1k5
R230 33
C194 6n8
R246 47k
C192 1
TR110 BC238B
D116 1N4004 GP
C195 100n
OVERVOLTAGE TRIP
LINE DRIVER
LINE OUTPUT
A
B
C
D
E
1
2
3
RV166 Delay Line Amp
RV172 A.P.C.
DL112 CHROMA DELAY LINE
TUNER
AGC
RV113 Volume
RV141 Preset Brightness
RV180 Burst Phase
RV133 Brightness
RV147 Contrast
RV151 Colour
IC101
IC103
IC102
IC105
RV171 Field Hold
RV129 Line Hold
RV202 Height
SK101 EARPHONE SOCKET
LS
DL107 LUMA DELAY LINE
FIELD SCAN
LINE SCAN
EHT TO CRT
To PL902/1
To PL902/4
To PL902/5
To PL905/1
To PL909
To PL907/3
To PL902/7
To PL902/6
18 Vin
18Vout
CHAN
AFC
BASE
AERIAL SOCKET
VISION CARRIER
CHROMA DELAY LINE DL112



Main Receiver Board, PC1140-003 viewed through copper side



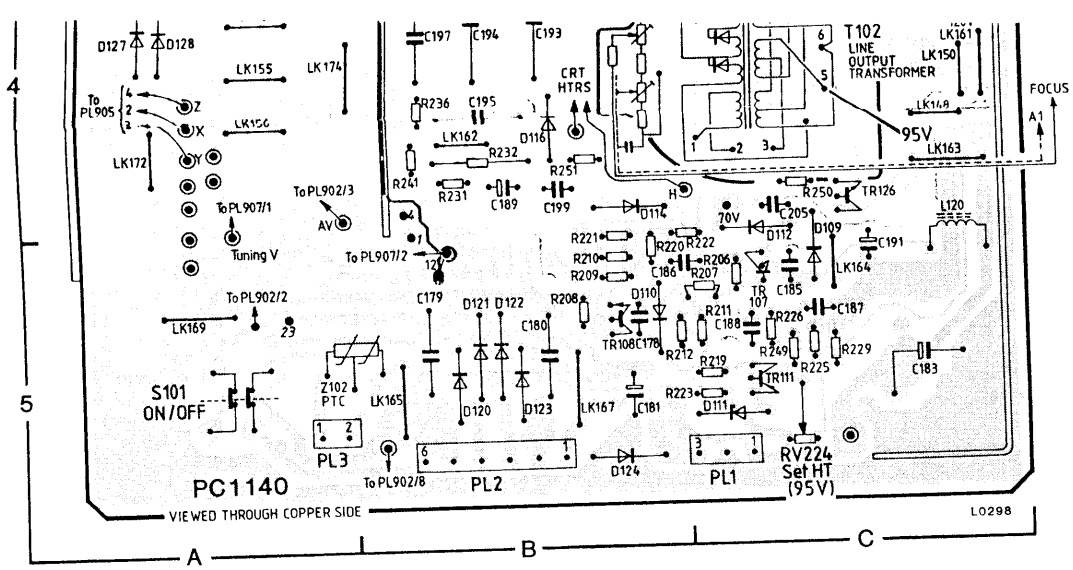
Main Receiver Board, PC1140-003 viewed fr

This circuit diagram sheet is to be used in conjunction with Section G

GRID REFERENCES

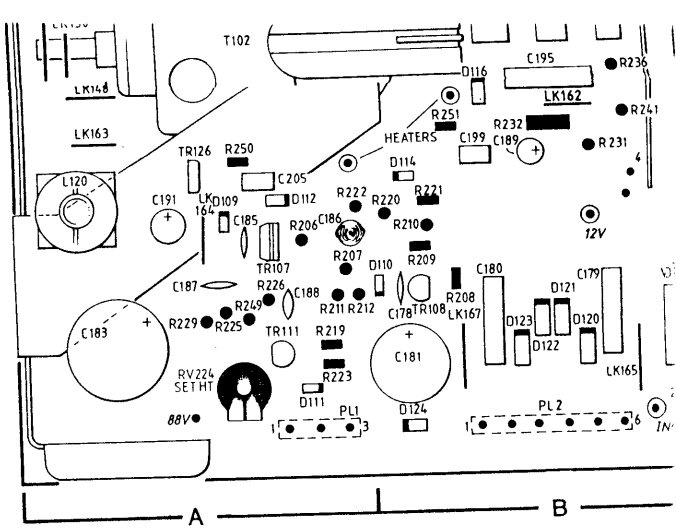
Main Receiver Board

C138	G2, *C2*	C177	B5, *B3*	D107	F5, *A3*	IC101	C2,
C139	G2, *C2*	C178	D5, *B5*	D109	C4, *A5*	IC102	E2,



Main Receiver Board, PC1140-003 viewed through copper side

12V
95V
150V



Main Receiver Board, PC1140-003 viewed fr

This circuit diagram sheet is to be used in conjunction with Section G

FERGUSON TX

THORN EM

14C2, 16AI & 16A2 Circuit Diagrams & Board Layouts

TX90 September 1986

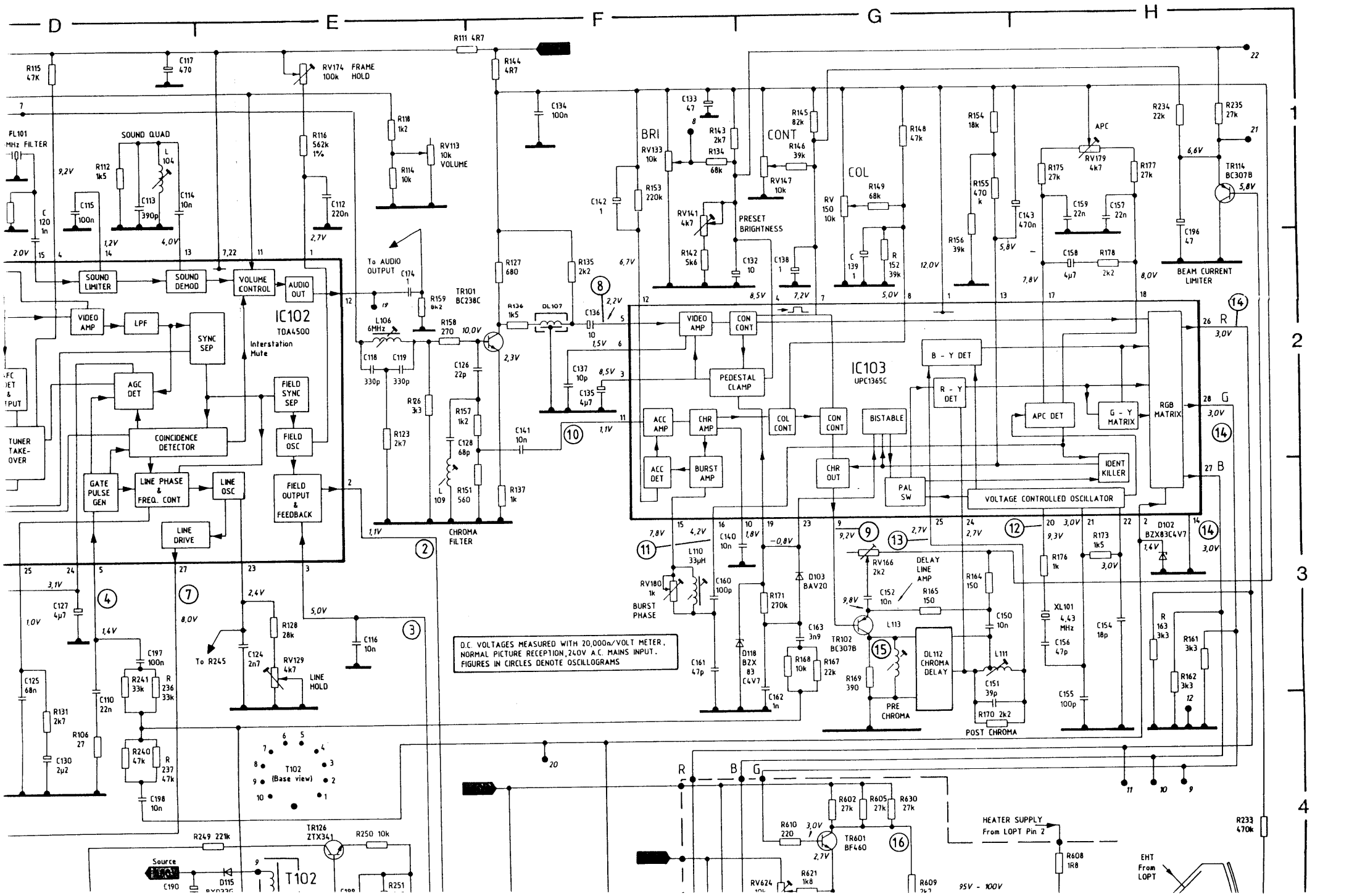
GRID REFERENCES

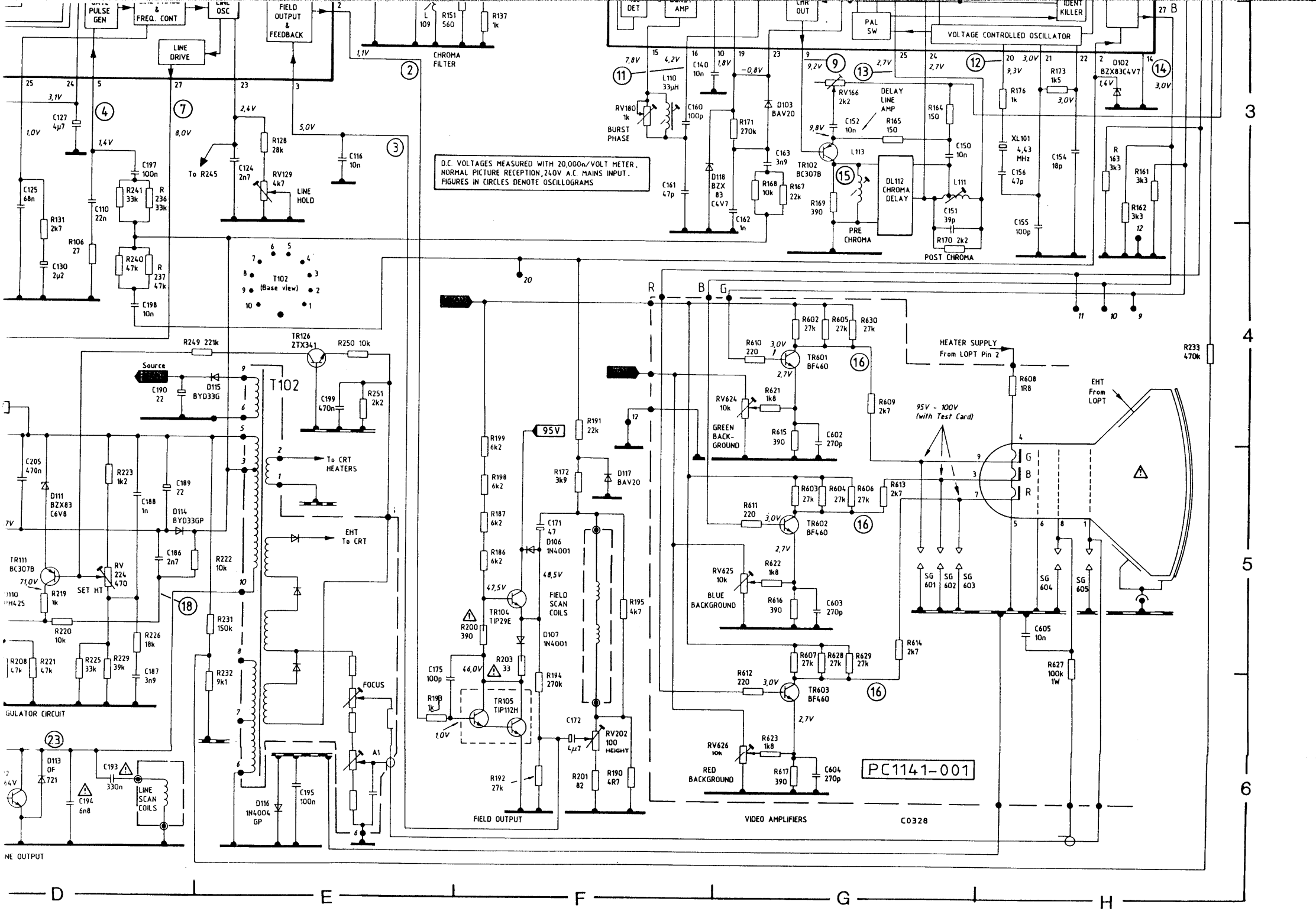
Main Receiver Board

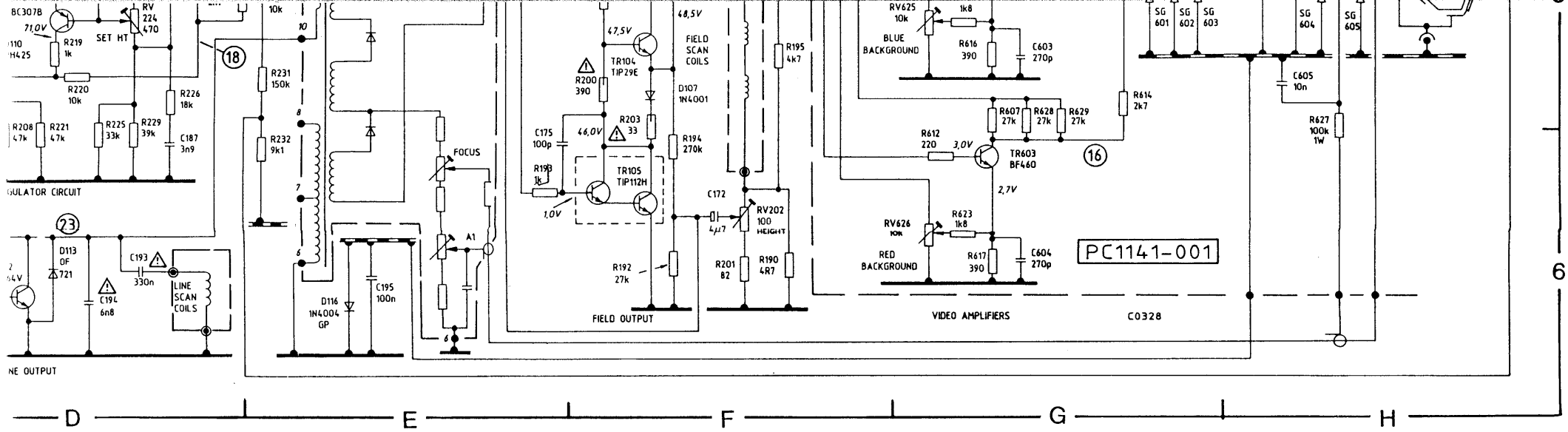
The circuit diagram location is followed by the printed panel location.

PC1140-003

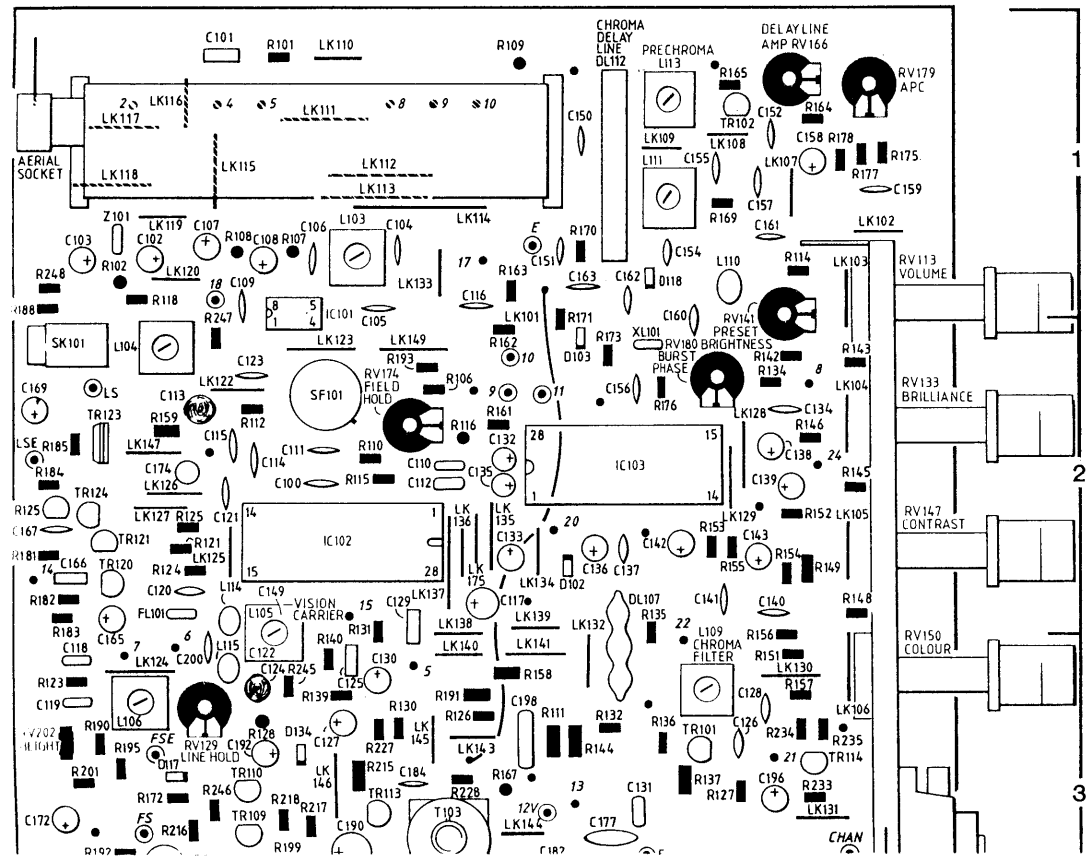
C100	C3,*A2*	C119	E2,*A3*	C138	G2,*C2*	C177	B5,*B3*	D107	F5,*A3*	IC101	
C101	A4,*A1*	C120	D1,*A2*	C139	G2,*C2*	C178	D5,*B5*	D109	C4,*A5*	IC102	
C102	B3,*A1*	C121	C3,*A2*	C140	F3,*C2*	C179	B5,*B5*	D110	D5,*B5*	IC103	
C103	B4,*A1*	C122	C1,*A2*	C141	F2,*B2*	C180	B5,*B5*	D111	D5,*A5*	IC105	
C104	B2,*B1*	C123	C1,*A2*	C142	F1,*B2*	C181	B5,*B5*	D112	C5,*A5*		
C105	B3,*B1*	C124	E3,*A3*	C143	H1,*C2*	C182	C5,*B3*	D113	D6,*B4*	L103	
C106	B2,*A1*	C125	D3,*A3*	C149	C1,*A2*	C183	B5,*A5*	D114	D5,*B4*	L104	
C107	B3,*A1*	C126	E2,*C3*	C150	G3,*B1*	C184	C6,*B3*	D115	E4,*A4*	L105	
C108	C3,*A1*	C127	D3,*A3*	C151	G3,*B1*	C185	C5,*A5*	D116	E6,*B4*	L106	
C109	B2,*A1*	C128	E2,*C3*	C152	G3,*C1*	C186	D5,*A5*	D117	F5,*A3*	L109	
C110	D3,*B2*	C129	C3,*B2*	C154	H3,*B1*	C187	D6,*A5*	D118	F3,*B1*	L110	
C111	C2,*A2*	C130	D4,*B3*	C155	H3,*B1*	C188	D5,*A5*	D120	B5,*B5*	L111	
C112	E1,*B2*	C131	D4,*B3*	C156	H3,*B2*	C189	D5,*B4*	D121	B5,*B5*	L113	
C113	D1,*A2*	C132	G2,*B2*	C157	H1,*C1*	C190	D4,*A3*	D122	B5,*B5*	L114	
C114	D1,*A2*	C133	F1,*B2*	C158	H2,*C1*	C191	D5,*A5*	D123	B5,*B5*	L115	
C115	D1,*A2*	C134	F1,*C2*	C159	H1,*C1*	C192	C6,*A3*	D124	B6,*B5*	L120	
C116	E3,*B1*	C135	F2,*B2*	C160	F3,*B1*	C193	D6,*B4*	D125	D6,*B3*		
C117	D1,*B2*	C136	F2,*B2*	C161	F3,*C1*	C194	D6,*B4*	D127	A3,*C4*	PL1	
C118	E2,*A3*	C137	F2,*B2*	C162	G3,*B1*	C195	E6,*B4*	D128	B3,*C4*	PL2	
				C163	G3,*B1*	C196	H1,*C3*	D133	B3,*B3*	PL3	
				C165	B4,*A2*	C197	D3,*B4*	D134	C6,*A3*		
				C166	C3,*A2*	C198	D4,*B3*			R101	
				C167	C4,*A2*	C199	E4,*B4*	DL107	F2,*B2*	R102	
				C169	C4,*A2*	C200	D1,*A3*	DL112	G3,*B1*	R103	
				C171	F5,*A3*	C205	D5,*A4*			R104	
				C172	F6,*A3*			FL101	D1,*A2*	R106	
				C174	E2,*A2*	D102	H3,*B2*			R107	
				C175	E6,*A4*	D103	G3,*B2*	FS101	A5,	R108	
				C176	B5,*B3*	D106	F3,*A4*	FS102	A5,	R109	


IC102
TDA4500
IC103
UPC1365C
SOUND LIMITER
SOUND DEMOD
VOLUME CONTROL
AUDIO OUT
VIDEO AMP
LPF
SYNC SEP
AGC DET
COINCIDENCE DETECTOR
FIELD SYNC SEP
FIELD OSC
GATE PULSE GEN
LINE PHASE & FREQ. CONT
LINE OSC
FIELD OUTPUT & FEEDBACK
LINE DRIVE
Interstation Mute
SOUND QUAD
RV174 FRAME HOLD
RV113 10k VOLUME
To AUDIO OUTPUT
TR101 BC238C
L106 6MHz
CHROMA FILTER
BRI
CONT
COL
PRESET BRIGHTNESS
BEAM CURRENT LIMITER
APC
VIDEO AMP
CON CONT
PEDESTAL CLAMP
ACC AMP
CHR AMP
COL CONT
CON CONT
BISTABLE
ACC DET
BURST AMP
CHR OUT
PAL SW
B - Y DET
R - Y DET
APC DET
G - Y MATRIX
RGB MATRIX
IDENT KILLER
VOLTAGE CONTROLLED OSCILLATOR
BURST PHASE
DELAY LINE AMP
DL112 CHROMA DELAY
PRE CHROMA
POST CHROMA
D.C. VOLTAGES MEASURED WITH 20,000n/VOLT METER.
NORMAL PICTURE RECEPTION, 240V A.C. MAINS INPUT.
FIGURES IN CIRCLES DENOTE OSCILLOGRAMS
To R245
LINE HOLD
T102
(Base view)
TR126 ZTX341
HEATER SUPPLY From LOPT Pin 2
TR601 BF460
EHT From LOPT
95V - 100V
D
E
F
G
H
1
2
3
4


PULSE GEN
FREQ. CONT
LINE OSC
LINE DRIVE
FIELD OUTPUT & FEEDBACK
CHROMA FILTER
DET
AMP
CHR OUT
PAL SW
VOLTAGE CONTROLLED OSCILLATOR
IDENT KILLER
BURST PHASE
DELAY LINE AMP
PRE CHROMA
DL112 CHROMA DELAY
POST CHROMA
LINE HOLD
To R245
T102 (Base view)
D.C. VOLTAGES MEASURED WITH 20,000Ω/VOLT METER. NORMAL PICTURE RECEPTION, 240V A.C. MAINS INPUT. FIGURES IN CIRCLES DENOTE OSCILLOGRAMS
TR126 ZTX341
Source
To CRT HEATERS
EHT To CRT
SET HT
FOCUS
LINE SCAN COILS
FIELD SCAN COILS
FIELD OUTPUT
HEATER SUPPLY From LOPT Pin 2
EHT From LOPT
95V - 100V (with Test Card)
GREEN BACK-GROUND
BLUE BACKGROUND
RED BACKGROUND
VIDEO AMPLIFIERS
PC1141-001
C0328
GULATOR CIRCUIT
NE OUTPUT



Oscillograms denoted by figures in circles are similar to those shown on PC1140 Sheet, Issue Two



INSTALLATION

Power Supplies

Fully isolated and suitable for a.c. mains connection 250V a.c., 50Hz.
Provision is made for add-on Battery Converter, Type TA127B (14C1 and 14C2 only).

Two 20mm cartridge type fuses are mounted on the mains transformer and are rated as follows:

Model	Primary	Secondary
14C1	T1A	T1A
14C2	T1A	T1A6
16A1	T1A	T1A6
16A2	T1A6	T2A

Setting 95V HT line, RV224

(97·5V for 16A1 and 16A2)

1. Turn **Brightness, Contrast and Colour** Controls to minimise to obtain a dark screen, i.e. zero beam current—if necessary turn the **A1** preset to minimum to achieve this.

2. Connect the meter (100V range) to pin 5 of the line output transformer and if necessary adjust **RV224** to give 95V (97·5V). This control also presets the EHT.

Channel Tuning

3. Remove the link from R139.

An alternative method, in the absence of suitable test equipment, would be to rotate the preset first in one direction and then in the opposite direction noting the two positions where the frame breaks. Leave the control set midway between these two points.

Picture Height, RV202

Adjust for full vertical scan consistent with a correctly proportioned picture.

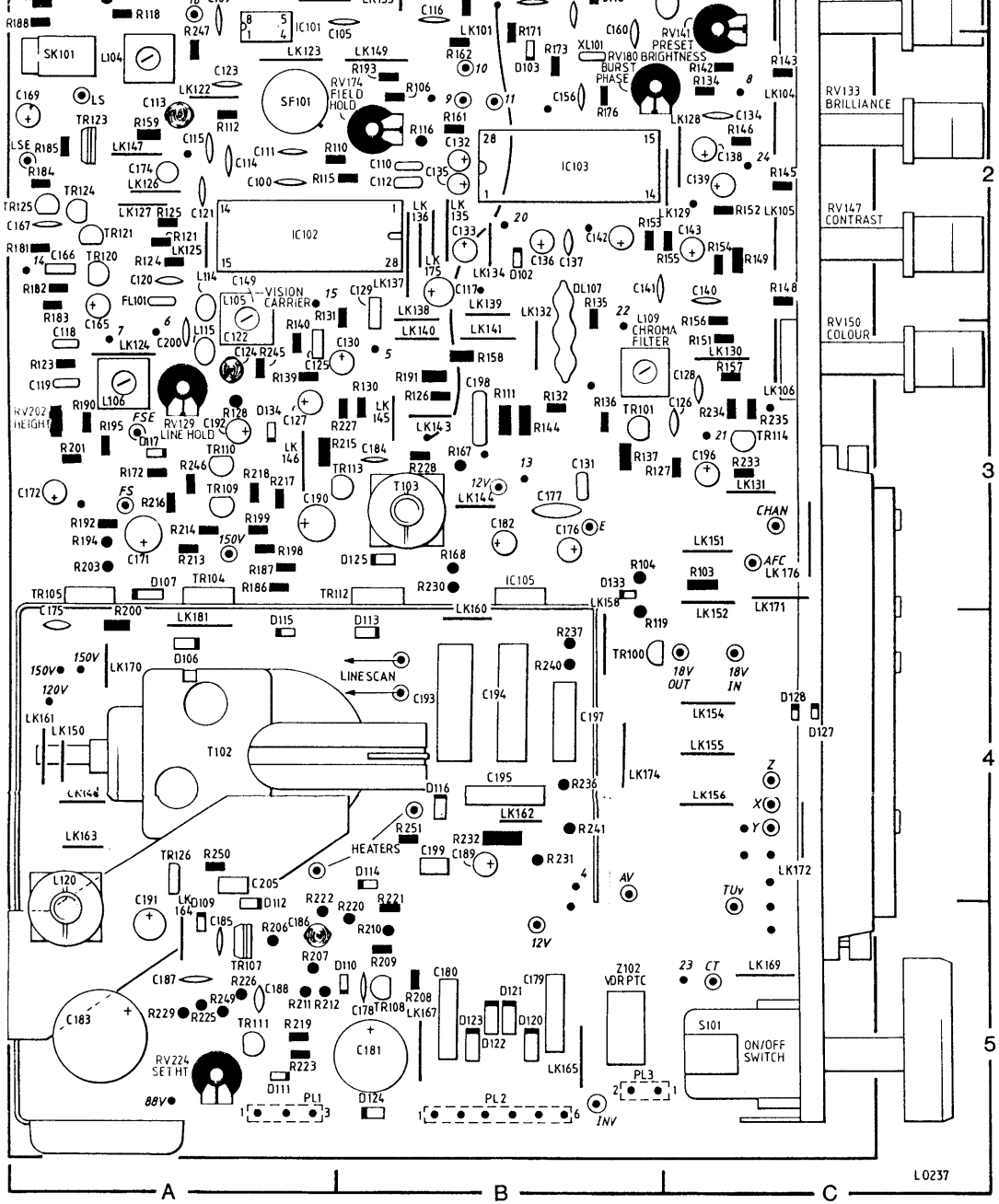
Focus

Adjust for optimum overall resolution.

Preset Brightness and Grey-Scale

1. Mute the video by connecting a 470Ω resistor between the 12V rail and pin 16 of IC102.

2. Turn the **Brightness** control to mid position. Turn the **Contrast** and **Colour** controls also the **Preset Brightness** and **A1** presets all fully anticlockwise. Turn the **Background** presets fully clockwise (viewed from copper side of CRT base board).



Main Receiver Board, PC1140-003 viewed from component side

Two 20mm cartridge type fuses are mounted on the mains transformer and are rated as follows:

Model	Primary	Secondary
14C1	T1A	T1A
14C2	T1A	T1A6
16A1	T1A	T1A6
16A2	T1A6	T2A

Setting 95V HT line, RV224
(97·5V for 16A1 and 16A2)

1. Turn **Brightness, Contrast and Colour** Controls to minimise to obtain a dark screen, i.e. zero beam current—if necessary turn the **A1** preset to minimum to achieve this.

2. Connect the meter (100V range) to pin 5 of the line output transformer and if necessary adjust **RV224** to give 95V (97·5V). This control also presets the EHT.

Channel Tuning

The procedure for Remote Control models is described in Section B. A tuning key is provided in non-remote models.

AFC is defeated when the tuning flap is open.

Line Hold, RV129

1. Fit a link between pin 28 of IC102 and earth.

2. Fit a 2·7kΩ resistor between pin 7 of IC102 and pin 26 of IC102.

3. Adjust **RV129** for a floating picture.

4. After removing the shorting link and the resistor the picture should lock.

Frame Hold

This preset is adjusted at the factory, and normally should not require readjustment in service.

If adjustment becomes necessary proceed as follows:

1. Disable the sync separator by linking across R139.

2. Connect an oscilloscope or counter to the cathode of D117 and adjust **Field Hold, RV174** for 45Hz.

opposite direction noting the two positions where the frame breaks. Leave the control set midway between these two points.

Picture Height, RV202

Adjust for full vertical scan consistent with a correctly proportioned picture.

Focus

Adjust for optimum overall resolution.

Preset Brightness and Grey-Scale

1. Mute the video by connecting a 470Ω resistor between the 12V rail and pin 16 of IC102.

2. Turn the **Brightness** control to mid position. Turn the **Contrast** and **Colour** controls also the **Preset Brightness** and **A1** presets all fully anticlockwise. Turn the **Background** presets fully clockwise (viewed from copper side of CRT base board).

3. Check the collector voltage on any one of the video output transistors (typically 145-155V).

4. Adjust the **Preset Brightness, RV141** until above voltage drops by 5V.

5. Adjust each **Background** preset in turn for 125V on the associated video output transistor collector.

6. Collapse the field by placing a link across field deflector coils.

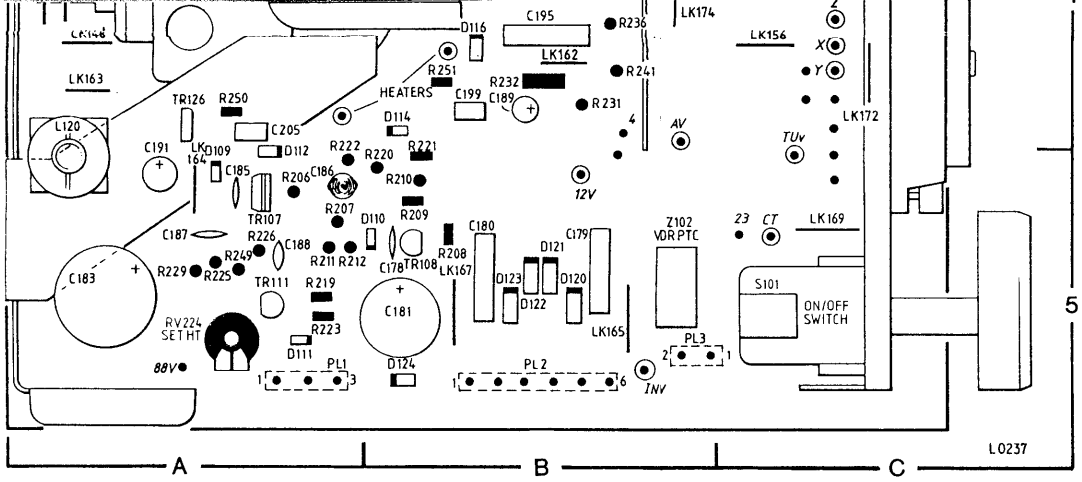
7. Adjust the **A1** preset until a line is just visible on the screen.

8. Adjust the **Background** presets for a white line on the screen, i.e. bring up the two low colours.

9. Remove resistor and restore raster.

10. Adjust the customer controls for normal reception.

The manufacturers reserve the right to vary specifications or use alternative materials as may be deemed necessary or desirable at any time.



Main Receiver Board, PC1140-003 viewed from component side

3. Adjust **RV129** for a floating picture.

4. After removing the shorting link and the resistor the picture should lock.

Frame Hold

This preset is adjusted at the factory, and normally should not require readjustment in service.

If adjustment becomes necessary proceed as follows:

1. Disable the sync separator by linking across R139.

2. Connect an oscilloscope or counter to the cathode of D117 and adjust **Field Hold, RV174** for 45Hz.

field deflector coils.

7. Adjust the **A1** preset until a line is just visible on the screen.

8. Adjust the **Background** presets for a white line on the screen, i.e. bring up the two low colours.

9. Remove resistor and restore raster.

10. Adjust the customer controls for normal reception.

The manufacturers reserve the right to vary specifications or use alternative materials as may be deemed necessary or desirable at any time.

G2,*C2*
G2,*C2*
F3,*C2*
F2,*B2*
F1,*B2*
H1,*C2*
C1,*A2*
G3,*B1*
G3,*B1*
G3,*C1*
H3,*B1*
H3,*B1*
H3,*B2*
H1,*C1*
H2,*C1*
H1,*C1*
F3,*B1*
F3,*C1*
G3,*B1*
G3,*B1*
B4,*A2*
C3,*A2*
C4,*A2*
C4,*A2*
F5,*A3*
F6,*A3*
E2,*A2*
E6,*A4*
B5,*B3*

C177 ... B5,*B3*
C178 ... D5,*B5*
C179 ... B5,*B5*
C180 ... B5,*B5*
C181 ... B5,*B5*
C182 ... C5,*B3*
C183 ... B5,*A5*
C184 ... C6,*B3*
C185 ... C5,*A5*
C186 ... D5,*A5*
C187 ... D6,*A5*
C188 ... D5,*A5*
C189 ... D5,*B4*
C190 ... D4,*A3*
C191 ... D5,*A5*
C192 ... C6,*A3*
C193 ... D6,*B4*
C194 ... D6,*B4*
C195 ... E6,*B4*
C196 ... H1,*C3*
C197 ... D3,*B4*
C198 ... D4,*B3*
C199 ... E4,*B4*
C200 ... D1,*A3*
C205 ... D5,*A4*

D102 ... H3,*B2*
D103 ... G3,*B2*
D106 ... F3,*A4*

D107 ... F5,*A3*
D109 ... C4,*A5*
D110 ... D5,*B5*
D111 ... D5,*A5*
D112 ... C5,*A5*
D113 ... D6,*B4*
D114 ... D5,*B4*
D115 ... E4,*A4*
D116 ... E6,*B4*
D117 ... F5,*A3*
D118 ... F3,*B1*
D120 ... B5,*B5*
D121 ... B5,*B5*
D122 ... B5,*B5*
D123 ... B5,*B5*
D124 ... B6,*B5*
D125 ... D6,*B3*
D127 ... A3,*C4*
D128 ... B3,*C4*
D133 ... B3,*B3*
D134 ... C6,*A3*

DL107 ... F2,*B2*
DL112 ... G3,*B1*

FL101 ... D1,*A2*

FS101 ... A5, –
FS102 ... A5, –

IC101 ... C2,*A1*
IC102 ... E2,*A2*
IC103 ... G2,*B2*
IC105 ... B5,*B3*

L103 ... B2,*A1*
L104 ... D1,*A2*
L105 ... C1,*A2*
L106 ... E2,*A3*
L109 ... E3,*B3*
L110 ... F3,*C1*
L111 ... G3,*B1*
L113 ... G3,*B1*
L114 ... D1,*A2*
L115 ... C1,*A3*
L120 ... B4,*A4*

PL1 ... A6,*A5*
PL2 ... A5,*B5*
PL3 ... A6,*B5*

R101 ... B2,*A1*
R102 ... A1,*A1*
R103 ... B1,*C3*
R104 ... C1,*B3*
R106 ... D1,*B2*
R107 ... B1,*A1*
R108 ... C1,*A1*
R109 ... B3,*B1*

R110 ... C2,*A2*
R111 ... E1,*B3*
R112 ... D1,*A2*
R114 ... E1,*C1*
R115 ... D1,*A2*
R116 ... E1,*B2*
R118 ... E1,*A1*
R119 ... C3,*B4*
R121 ... D1,*A2*
R123 ... E2,*A3*
R124 ... C2,*A2*
R125 ... C1,*A2*
R126 ... E2,*B3*
R127 ... F2,*C3*
R128 ... E3,*A3*
R130 ... C3,*B3*
R131 ... D4,*A2*
R132 ... D4,*B3*
R134 ... F1,*C2*
R135 ... F2,*B2*
R136 ... F2,*B3*
R137 ... F3,*B3*
R139 ... C3,*A3*
R140 ... C3,*A3*
R142 ... F2,*C2*
R143 ... F1,*C2*
R144 ... F1,*B3*
R145 ... G1,*C2*
R146 ... G1,*C2*

R148 ... G1,*C2*
R149 ... G1,*C2*
R151 ... E3,*C3*
R152 ... G2,*C2*
R153 ... F1,*B2*
R154 ... G1,*C2*
R155 ... G1,*C2*
R156 ... G1,*C2*
R157 ... E2,*C3*
R158 ... E2,*B3*
R159 ... E2,*A2*
R161 ... H3,*B2*
R162 ... H3,*B2*
R163 ... H3,*B1*
R164 ... G3,*C1*
R165 ... G3,*C1*
R167 ... G3,*B3*
R168 ... G3,*B3*
R169 ... G3,*C1*
R170 ... G4,*B1*
R171 ... G3,*B1*
R172 ... F5,*A3*
R173 ... H3,*B2*
R175 ... H1,*C1*
R176 ... H3,*B2*
R177 ... H1,*C1*
R178 ... H2,*C1*
R181 ... B4,*A2*
R182 ... B4,*A2*

R183 ... B3,*A2*
R184 ... C4,*A2*
R185 ... C4,*A2*
R186 ... F5,*A3*
R187 ... F5,*A3*
R188 ... C4,*A1*
R190 ... F6,*A3*
R191 ... F4,*B3*
R192 ... F6,*A3*
R193 ... E6,*B2*
R194 ... F6,*A3*
R195 ... F5,*A3*
R198 ... F5,*A3*
R199 ... F4,*A3*
R200 ... F5,*A4*
R201 ... F6,*A3*
R203 ... F5,*A3*
R206 ... C5,*A5*
R207 ... C5,*A5*
R208 ... D6,*B5*
R209 ... D6,*B5*
R210 ... D6,*B5*
R211 ... C5,*A5*
R212 ... C5,*A5*
R213 ... C5,*A3*
R214 ... C5,*A3*
R215 ... C6,*A3*
R216 ... C6,*A3*
R217 ... C6,*A3*

R218 ... C6,*A3*
R219 ... D5,*A5*
R220 ... D5,*B5*
R221 ... D6,*B5*
R222 ... E5,*A5*
R223 ... D5,*A5*
R225 ... D6,*A5*
R226 ... D5,*A5*
R227 ... C6,*B3*
R228 ... C6,*B3*
R229 ... D6,*A5*
R230 ... D6,*B3*
R231 ... E5,*B4*
R232 ... E6,*B4*
R233 ... H4,*C3*
R234 ... H1,*C3*
R235 ... H1,*C3*
R236 ... D3,*B4*
R237 ... D4,*B4*
R240 ... D4,*B4*
R241 ... D3,*B4*
R245 ... C6,*A3*
R246 ... C6,*A3*
R247 ... A1,*A2*
R248 ... C4,*A1*
R249 ... D4,*A5*
R250 ... E4,*A4*
R251 ... E4,*B4*

RV113 ... E1,*C1*
RV129 ... E3,*A3*
RV133 ... F1,*C2*
RV141 ... F1,*C1*
RV147 ... G1,*C2*
RV150 ... G1,*C3*
RV166 ... G3,*C1*
RV174 ... E1,*B2*
RV179 ... H1,*C1*
RV180 ... F3,*B2*
RV202 ... F6,*A3*
RV224 ... D5,*A5*

S101 ... B5,*C5*

SF101 ... C2,*B2*

SK101 ... C4,*A2*

T101 ... A5, –
T102 ... E4,*A4*
T103 ... C6,*B3*

TR100 ... B3,*B4*
TR101 ... F2,*B3*
TR102 ... G3,*C1*
TR104 ... F5,*A3*
TR105 ... F6,*A3*
TR107 ... C5,*A5*

TR108 ... D5,*B5*
TR109 ... C6,*A3*
TR110 ... C6,*A3*
TR111 ... D5,*A5*
TR112 ... D6,*B3*
TR113 ... C6,*B3*
TR114 ... H1,*C3*
TR120 ... C4,*A2*
TR121 ... C4,*A2*
TR123 ... C4,*A2*
TR124 ... C4,*A2*
TR125 ... C4,*A2*
TR126 ... E4,*A4*

XL101 ... H3,*B2*

Z101 ... A3,*A1*
Z102 ... B6,*B5*

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S102 ... A2, –
S103 ... A2, –
S104 ... A3, –
S106 ... A3, –